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A Report on Market Structure Research in Agricultural Economics ..... 513

Market Structure Analysis as an Orientation for Research in Agricultural Economics ..... *Robert L. Clodius and Willard F. Mueller* 515

A Policy to Redistribute Losses from Economic Progress ..... *Theodore W. Schultz* 554

Public Purpose in Agricultural Research and Education ..... *Earl O. Heady* 566

Farm Legislation in the 86th Congress ..... *Ross B. Talbot* 582

The Role of Farm Management in Underdeveloped Countries ..... *Jerome K. Pasto* 606

Title to Land ..... *Arthur J. Walrath* 616

The Economic Significance of Woodland Reclamation by British Farms ..... *Norman Hilton* 626

*Contents continued on Cover II*

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THE AMERICAN FARM ECONOMIC ASSOCIATION
Volume XLIII AUGUST, 1961 Number 3

CONTENTS *(Continued)*


NOTES

Agricultural Policy in the European Common Market ..... *J. H. Richter* 637

Free Competition, Uncertainty and Farmer Decisions ..... *John L. Dillon and Earl O. Heady* 643

Supply Functions for Milk Under Varying Price Situations .. *Randolph Barker* 651

Non-Agricultural Income of Land-Cultivating Families in Germany ..... *Frithjof Kuhnen* 659

Mechanization in Underdeveloped Countries ... *Ottar Nervik and E. Haghjoo* 663

Factors Related to Leaving Farming ..... *Prodipto Roy* 666

Implications of Changes in Market Structure on Extension Marketing Programs and Administration ..... *Leon Garoian* 674

Effect of Air Freight Rates on Cut Flower Sales ..... *D. B. DeLoach and W. Miklius* 683

A Study of Consumer Preference for Applesauce Using the Two-Visit Interview Technique ..... *Douglas J. Dalrymple* 690

Effects of Selected Variables on Prices of Calves in Virginia Feeder Calf Sales ..... *K. C. Williamson, R. C. Carter, and J. A. Gaines* 697

The Diet Problem Revisited: A Linear Programming Model for Convex Economists ..... *Paul E. Smith* 706

Correction: Ph.D. Degrees, 1960 ..... 712

PUBLICATIONS RECEIVED ..... 713

REVIEWS

Mordecai Ezekiel and Karl A. Fox, *Methods of Correlation and Regression Analysis, Linear and Curvilinear* ..... *Harold O. Carter* 721

Walter Isard, *Methods of Regional Analysis: An Introduction to Regional Science* ..... *Carleton C. Dennis* 724

Bob R. Holdren, *The Structure of a Retail Market and the Market Behavior of Retail Units* ..... *Richard O. Been* 726

Edward W. Smykay, Donald J. Bowersox, and Frank H. Mossman, *Physical Distribution Management* ..... *Charles E. French* 728

G. S. Tolley and F. E. Riggs, *Economics of Watershed Planning* ..... *John Blackmore* 730

*Water Resources Activities in the United States* ..... *A. Allan Schmid* 731

*Criteria for Fixation of Water Rates and Selection of Irrigation Projects* .. *Michael F. Brewer* 733

NEWS NOTES ..... 735

WINTER PROGRAM OF THE AMERICAN FARM ECONOMIC ASSOCIATION, JOINT SOCIAL SCIENCE ASSOCIATION MEETINGS ..... 746


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637
643
651
659
663
666
674
683
690
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706
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721
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JOURNAL
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FARM ECONOMICS

Volume XLIII AUGUST, 1961 Number 3

# A REPORT ON MARKET STRUCTURE RESEARCH IN AGRICULTURAL ECONOMICS*

## FOREWORD

MANY agricultural processing and distributing industries are experiencing rapid and drastic changes. These changes may have important implications for farmers and consumers, as well as for the firms operating in these industries. As a result, economists and those concerned with public policy have displayed increasing interest toward the impact of various growth methods, competitive practices and other phenomena bearing on the performance of these industries.

These changes present enormous challenges and opportunities for agricultural economists. Until recently the industrial organization and performance of the agricultural industries have received scant attention by them. The magnitude of current interest in this subject is suggested by the fact that 41 Agricultural Experiment Stations have projects dealing with some aspect of this problem.

The methodology useful in attacking problems in this area is not as well developed or precise as one might wish. And, unfortunately, many persons working on problems in this area are not very well acquainted with the theoretical tools which are useful in studying these problems, or the past and current work in this area.

As an aid toward overcoming these problems a Subcommittee of North Central Regional Research Committee NCR-20, Economics of Marketing, prepared this statement. It is designed to accomplish the following:

First, it presents the nature and analytical framework of market struc-

* Prepared by a Subcommittee of North Central Regional Research Committee NCR-20. Members of the Subcommittee and associates were: Paul L. Farris, Chairman, Purdue University; Robert L. Clodius, University of Wisconsin; Winn F. Finner, Economic Research Service, USDA; L. B. Fletcher, Iowa State University; James B. Hassler, University of Nebraska; E. Fred Koller, University of Minnesota; Milton L. Manuel, Kansas State University; Willard F. Mueller, past Chairman, University of Wisconsin; Paul E. Nelson, Economic Research Service, USDA; Ralph Nelson, South Dakota State College; and Jerry West, University of Missouri.

ture analysis. Second, it suggests a number of research areas which might be analyzed, in part, within this framework of analysis. Third, it provides a number of abstracts of important writings in this field. Fourth, it summarizes several important empirical studies employing market structure analysis, indicating the particular methodology used. Fifth, it presents a bibliography of completed research studies in this area involving industries related to agriculture. Sixth, it lists current research projects of the Agricultural Experiment Stations and the USDA dealing with various aspects of the organization and performance of agricultural industries.

The Subcommittee cautions the reader against inferring that market structure analysis provides the only useful theoretical framework for studying these problems. We recognize that the market structures in which firms operate do not explain all firm conduct and industrial performance. Factors internal to the firm and external to the market also may be important. The whole field of organization theory is concerned with the impact of the internal organization of the firm on its conduct; it is concerned, as Leibenstein says, "with the human agent in the production process." However, we have emphasized market structure analysis as a frame of reference because there already is a rich body of theory developed in this area, and because empirical studies have demonstrated the usefulness of this theory. Another Subcommittee of NCR-20 intends at a future date to study other areas of inquiry useful in explaining the causes of industrial performance. The intent of the present report is to stimulate more productive research aimed at understanding the organization and performance of the agricultural industries.

# MARKET STRUCTURE ANALYSIS AS AN ORIENTATION FOR RESEARCH IN AGRICULTURAL ECONOMICS

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*University of Wisconsin*

## *I. Analytical Framework*

AGRICULTURAL economists have used the term structure as part of their vocabulary for many years. It has been defined to include such diverse economic phenomena as marketing channels and facilities, geographic and temporal price relationships, and the values of the elasticity coefficients in agricultural markets. These are all legitimate definitions for the purposes intended. But such usage should not be confused with the term structure as used in market structure analysis. Here we shall present a statement of what is meant by this term in market structure theory and shall discuss some important areas in which agricultural economists should devote more research resources.

### *The model and its elements*

What is here called market structure analysis has one basis in formal economic theory and the second in the institutional-empirical observations of industrial experience. Marshallian and neo-Marshallian theorists had derived theorems about the performance of an industry characterized by large numbers of small firms, homogeneous products, and free entry and exit, at one end of the scale, and of single-firm monopoly at the other. Concurrently, economists of an institutionalist persuasion developed studies of the organization and performance of industrial and labor markets where imperfections of all kinds were the significant characteristics. As formal theorists become increasingly aware of the wide variations to be found in the real world in the conduct of firms and in the performance of industries, modifications were made in the assumptions regarding number and size of firms, product and mobility. Fellner's treatment of number and size, Chamberlin's consideration of product characteristics, and Bain's study of entry are significant contributions in the specification of these variables.[1] How firms conduct themselves and how

* Prepared as a discussion paper both for the NCR-20 Subcommittee and for the Social Science Research Council Committee on Agricultural Economics and American Farm Economic Association Committee on New Orientations in Research. The authors wish to acknowledge the substantial contributions made by members of the SSRC-AFEA Committee and of the NCR-20 Subcommittee, especially Paul Farris, whose Subcommittee working paper was incorporated in many ways in this final draft.

[1] William Fellner, *Competition Among the Few* (New York: Alfred A. Knopf, 1949); Edward Chamberlin, *The Theory of Monopolistic Competition* (Cambridge:

industries perform in the aggregate may be explained to a high degree by these factors. However, in particular circumstances, explanation often must go beyond these three market characteristics.

As a first approximation and in a static setting, the theoretical model underlying market structure analysis is both deterministic and sequential in character. Key concepts are those of market *structure, conduct,* and *performance.* The direction of causation is assumed to run from structure through conduct to performance.

*Market structure* has become more and more precisely defined in recent years. It has come to mean the ". . . organizational characteristics which determine the relations of sellers in the market to each other, of buyers in the market to each other, of the sellers to the buyers, and of sellers established in the market to other actual or potential suppliers of goods, including potential new firms which might enter the market. In other words, market structure for practical purposes means those characteristics of the organization of a market which seem to influence strategically the nature of competition and pricing within the market."[2]

On the other hand, structure does not include anything external to the market such as national income or national policy; it does not include any personal factors relating to individuals in the market, rather it relates primarily to factors commonly found in every market that are significant internal features of the market setting, and that affect the conduct of firms.

The characteristics most emphasized as strategic aspects of market structure are:

1. *The degree of seller concentration,* described by the *number* and the *size distribution* of sellers in the market.
2. *The degree of buyer concentration,* defined in parallel fashion.
3. *The degree of product differentiation,* as among the outputs of the various sellers—that is, the extent to which their outputs (though similar) are viewed as nonidentical by buyers.
4. *The condition of entry* to the market, referring to the relative ease or difficulty with which new sellers may enter the market, as determined

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Harvard Univ. Press, 1946); Joe S. Bain, *Barriers to New Competition* (Cambridge: Harvard Univ. Press, 1956). Early in such analysis the problem of delineating the relevant market arises. Some helpful writings on this problem include Robert Triffin, *Monopolistic Competition and General Equilibrium Theory,* (Cambridge: Harvard Univ. Press, 1940); Andreas G. Papendreou and John T. Wheeler, *Competition and Its Regulation* (New York: Prentice-Hall, 1954); and Willard W. Cochrane, "The Market As A Unit of Inquiry In Agricultural Economics Research," *J. Farm Econ.,* 39: 21-37, Feb. 1957.

[2] Joe S. Bain, *Industrial Organization* (New York: John Wiley and Sons, Inc., 1959), p. 7.

generally by the advantages which established sellers have over potential entrants.[3]

These structural variables set forth by Bain are accepted in this paper. However, we wish to interpret No. 3, the degree of product differentiation, to include more generally market knowledge or information. We refer to the availability of relevant market information, its distribution among buyers and sellers, and its adequacy in terms of sharpening price-quality comparisons and of reducing risk or uncertainty about the future. Likewise included is the differential usefulness of market information to different firms depending on their size and other characteristics.

A concept related to market structure is *market conduct*. Market conduct refers to the ". . . patterns of behavior which enterprises follow in adapting or adjusting to the markets in which they sell (or buy)."[4] Significant dimensions of conduct include (1) methods employed by the firm or group of firms in determining price and output; (2) product policy; (3) sales promotion policy; (4) means of coordination and cross-adaptation of price, product and sales-promotion policies among competing firms; and (5) presence or absence of, and extent of, predatory or exclusionary tactics directed against either established rivals or potential entrants.[5]

*Market performance* refers to the economic results that flow from the industry as an aggregate of firms. Society is concerned with how an industry performs in terms of its efficiency, its progressiveness, its stability and the like. Bain includes the following as the principal dimensions of market performance.

1. The height of price relative to the average cost of production.
2. The relative efficiency of production so far as this is influenced by the scale or size of plants and firms (relative to the most efficient), and by the extent, if any, of excess capacity.
3. The size of sales-promotion costs relative to the costs of production.
4. The character of the product, including choice of design, level of quality, and variety of product within any market.
5. The rate of progressiveness of the firm and industry in developing both products and techniques of production, relative to evidently attainable rates and relative to the costs of progress.[6]

Thus, as a first approximation, market structure may be specified by

[3] Definitions in this section are from Bain, *ibid.* The framework and concepts he sets forth appear to represent the current general consensus of scholars of the general area of industrial organization and performance.

[4] *Ibid.*, p. 9.

[5] *Ibid.*, pp. 10-11.

[6] *Ibid.*, p. 12.

the number and size of firms, degree of product differentiation and market knowledge, and the conditions of entry. Proof of the logic of this—although inadequate to explain many problems of the real world—may be illustrated in the model of pure competition. The specified structural features of atomistic numbers, homogeneous product, and free entry and exit *require* a form of conduct such that each firm must operate as if in isolation. The consequence of this in the aggregate is an industry performance characterized by an output that sells at a price equal to both marginal and average cost.

Another example at the opposite end of the spectrum is single firm monopoly where the sole firm, product, and blocked entry features of structure determine a conduct, hence industry performance, of output where $MC = MR \neq AR$ and there are excess profits.

More sophisticated approximations lead to other specifications of these three structural features that prescribe different conduct and different results in industrial performance more closely descriptive of the real world. As number of firms in a market becomes less than atomistic, as concentration ratios increase, firms inevitably recognize their mutual interdependence in their dealings and strategies. Private policy with respect to output and price becomes more meaningful. The "building in" of costs becomes more probable.

When the product is specified as being other than homogeneous, an entire new dimension of competition is created. Sources of product differentiation may be determined, the degree of it may be measured in terms of cross elasticities, and its relationship to entry explored.

Specification of degrees of entry may be made in terms of the height of the barriers to entry. Whereas number of firms relates to present competition, consideration of entry is directed at behavior relating to potential competition. The height of barriers is associated with the cost advantage of established firms, including economies of scale and the product advantage of established firms.

Such further specification within each of these three structural elements reveals something of importance for subsequent approximations of the model. Structural elements are not independent but are interrelated. For example, an important barrier to entry may be a product differentiation advantage; or, product differentiation may become a form of conduct in the market of few sellers.

Also, a more complete approximation of the model requires elaboration of the number of things to be included as elements of structure, the content of conduct, and the kinds and types of performance. In other words, as for most economic phenomena, the "true" model of competitive behavior and industry performance is probably a system of simultaneous equations with many variables. Not knowing or having the complete

system, economists approximate it as best they can with various simplifications made in the number of variables, the independence of variables, and processes in sequence.

In terms of market structure further approximation often requires consideration of the degree of vertical integration of a firm and the legal form of business organization of firms. Each of these has special significance for agriculture and is included here for that reason. Immediately the question arises whether these are aspects of structure, of conduct, or of performance. There is no logical problem here so long as a researcher realizes that a specification of structure conditioning behavior in one context may become a process for determination or a form of behavior in another. For example, the process of trying to achieve a differentiated product may be a significant feature of behavior of a firm, especially in an industry of few firms. As a consequence of achievement the firm may shift its conduct and follow new price policies appropriate for a differentiated product and perhaps have ultimate effect on performance. The interrelatedness among the categories of structure, conduct, and performance, and the interdependence among the elements within each category become apparent in considering researches in agriculture that have used or are using a market structure approach.

*Vertical integration, structure, and conduct.* Vertical integration is an interesting example of the complex interrelationship between market structure and conduct. Vertical integration simply is a form of business organization in which firms perform two or more production processes rather than specialize in a single one.[7] There are many market and technological reasons encouraging (and discouraging) firms to assume a vertically integrated form. Many of these reasons are integrally related to market structure variables and therefore only yield to meaningful analysis when viewed in this context.

Consider the case where a firm buys from an oligopolistic industry earning monopolistic returns. Such a firm would have an incentive to enter this industry if doing so could improve its profit position. Vertical integration induced by this motive should appropriately be viewed as a form of market conduct resulting from particular market structures. Thus, vertical integration may be a result of market structure rather than a cause. Answers to the questions of (1) whether firms have an *incentive* to integrate for such market structure reasons, (2) whether they have the *ability* to do so, and (3) how their integration will *affect* ultimate performance can only be answered by analysis of structural variables of the industries involved.

[7] Such integration of processes may be accomplished through actual ownership of several processes or through contractual arrangements which permit managerial decisions to be made jointly rather than individually.

Although vertical integration might be viewed as a form of conduct flowing from structure, in certain cases it should be viewed as a characteristic of market structure which determines conduct. Consider the case of an industry composed of 20 firms of equal size. If all were equally efficient, we would expect no one to be dominant, or to be capable of a competitive strategy not open to others. Introduce now the assumption that one rival is a vertically integrated firm possessing considerable market power in an adjacent industry from which all others buy. This variation in structure of the adjacent industry may have a profound influence on market conduct in the 20-firm industry because the integrated firm has the ability, and perhaps the incentive, to behave in a manner in the 20-firm industry entirely different from its rivals. It might, for example, become a price leader and follow a low price policy in the 20-firm industry and a high price policy in the adjacent industry. Its actions are no longer constrained in the 20-firm industry by the same market parameters as its rivals.

Thus, market conduct in this industry may be entirely different than one would expect if none were integrated, or if all were equally integrated. Here, market conduct may be seen to flow, in part, from the fact that a certain firm is vertically integrated.[8]

Whether vertical integration may most usefully be viewed as a *result* of structure or a *response* to it depends on the problem analyzed. But clearly market structure theory is most fruitful in suggesting meaningful hypotheses useful in analyzing its causes and implications.

*The legal form of business firms, structure and conduct.* When an industry is composed of firms with different legal characteristics this fact may influence market conduct. Nearly 30 years ago Berle and Means demonstrated the significance of the separation of ownership and control found in most contemporary American corporations.[9] When all firms in an industry are corporations, however, this no longer is an especially rewarding subject of inquiry in analyzing market conduct and performance, and it may be treated as a constant. But this potential determinant of firm and market conduct often becomes especially important in many agricultural processing industries because they still include proprietorships and partnerships, as well as corporations.

An especially interesting variation in firm organization in many agricultural processing industries is the agricultural cooperative. Under cer-

[8] Extensive diversification of a firm may permit similar market conduct. Hence, some economists have urged that the extent of a firm's diversification or conglomeration should be included as a structural variable. See especially, Corwin Edwards, "Conglomerate Bigness as a Source of Power," in *Business Concentration and Price Policy*, Natl. Bu. Econ. Res. (Princeton Univ. Press, 1955).

[9] A. A. Berle and Gardiner Means, *The Modern Corporation and Private Property* (New York, 1932).

tain assumptions we might expect that a farmer cooperative has different profit and other goals than its corporate rivals. For example, if the cooperative is viewed as the vertical extension of farm firms, its concept of what constitutes an "acceptable level" of profits might differ considerably from that of its rival corporate oligopolists. Such conflict of profit and other motives presumably could make for unstable oligopolistic solutions.

Under other assumptions a cooperative could be expected to behave no differently than its business rivals. But little analytical and empirical work has been done to test alternative hypothesis concerning the significance of cooperatives in relation to market structure dimensions. Too often the friends of cooperatives have rested their case by appeal to the "obviously" superior social performance of cooperatives; the foes of cooperatives have been even more prone to condemn without resort to economic analysis. Unhappily, empirical researchers have been of little help in developing reliable knowledge in this area. This shortcoming stems largely from a failure to ask the right questions; market structure theory provides abundant hypotheses useful in testing empirically the relationship between the market structure and conduct in industries which include cooperative organizations.

*Limitations and problems of the market structure framework*

The person who seeks to employ a market structure approach in his research must recognize that it cannot do everything. Its chief function is an orientation in research, that is useful in suggesting new ways of attacking old as well as emerging problems.

One of the problems the researcher working on problems in this area runs up against is disclosure of reliable information, especially where firm numbers are few. In the first instance is the reluctance of firms to give out information that might help either a competitor or the antitrust agencies. Even if full cooperation is received, the research man frequently cannot publish results that would disclose the data of a particular firm. In this age of publish or perish, the young economist may be handicapped by research so good it cannot be published.

Inherent in the approach is a difficulty arising from the fact that the internal decision making processes of the firm may change through time. Many students of industrial organization have observed that young and immature oligopolists often conduct themselves in a manner that generates instability. Some years later, however, performance is characterized by much greater stability even though numbers, concentration, product characteristics and so forth have not particularly changed. The explanation is that some firms may be slow to include new market structure

parameters into their decision making process.[10] This serves to show how dynamic variables have to be considered as adjuncts of the model in the same way as is true for the use of much of economic theory.

The potential researcher in this area is cautioned that market structure theories posit certain relationships between market structure and firm conduct which are, as yet, incompletely tested empirically. Moreover, the type of conduct resulting from a particular structure may vary significantly depending upon the internal organization of the firm. It is to explain such variations of behavior that a growing body of "organizational theory" is being developed. Such theories are concerned, as Leibenstein says, with the human agent in the production process.[11] This growing body of theory should receive the careful attention of students of industrial organization. It should supplement the use of market structure analysis.

It is appropriate here to emphasize the importance of the researcher's judgment throughout in his use of a market structure approach. Judgment operates in the initial selection of the problem for study, in the choice of factors to be considered as structural, in the decision whether a relationship is determining or determined, and in a host of others, including the conclusions reached and the generalizations to be drawn.

Generalizing is hazardous at best, but particularly is this true when the research deals with the conduct of a particular firm or group of firms in an industry. The findings of such "case" or "industry" studies are those of that time and place, and the conclusions reached are valid only with a time and place tag. Hopefully, the day will come when so many studies will have been made at different times and places that their effect can be partialled out and an appropriate probabilistic generalization may be made. Inability to generalize is sometimes used to discredit a pragmatic approach such as market structure, but the only important point here is that generalization is difficult and will be slow in coming. The cross-industry approach used by Bain in his recent studies[12] gives promise of greater generalizing ability than does the industry approach.

*Normative aspects of market structure analysis*

Market structure analysis can be carried on entirely within the realm of positive or predictive economics. In other words, the analysis may deal entirely with questions of *what is*, rather than *what should be*. But

[10] Nicholls made an excellent analysis of the way in which tobacco companies gradually modified their pricing policies until they approximated closely those suggested by oligopoly theory. William H. Nicholls, *Price Policies in the Cigarette Industries* (Vanderbilt Univ. Press, 1951).

[11] Harvey Leibenstein, *Economic Theory and Organizational Analysis* (New York: Harper and Brothers, 1960).

[12] Joe S. Bain, *Barriers to New Competition, op. cit.*

economists working with real problems of industrial organization and performance frequently are asked to go beyond explaining how a particular industry performs; they are also asked for their judgment as to whether its performance is *good enough*. In answering this normative question economists traditionally have used the model of perfect competition as a standard of desirable social performance.[13] However, because practically all modern industrial markets seriously violate the assumptions of pure competition, the competitive norm becomes an unattainable ideal. Consequently, some economists advocated what they consider the more realistic but less precise norm of "workable" or "effective" competition.

Since Clark's pioneering work on this concept,[14] economists have developed a variety of criteria an industry must possess for it to pass the test of being "workably"—although not perfectly—competitive. The suggested criteria can be divided conveniently in three categories: (1) market structure, (2) firm conduct, and (3) industrial performance. The researcher concerned with normative aspects of market structure should find considerable value in the extensive writings in this field.[15] Although the concept of workable competition is less precise than the norm of pure competition, it makes up in realism what it lacks in precision. This is one of the many cases in economics where it is preferable "to be vaguely right than precisely wrong."

### *II. Some Potential Areas for Empirical Research*

Market structure research is essentially problem oriented. And as in all problem-oriented research, the researcher often will use a variety of tools or techniques to attack his problems. By listing areas in which market structure analysis may prove useful we do not imply that this is the only tool the researcher will find useful; in some cases it may be of major importance, in others it will be of only minor importance.

Empirical research in market structure may conveniently be divided into three broad areas: (1) determination and measurement of the nature of market structures actually extant in particular industries, groups of related industries, and the economy as a whole, (2) analysis of the basic technological, market, and other factors responsible for particular market

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[13] R. G. Bressler, Jr., "Agriculture Marketing Research," *J. Farm Econ.*, Vol. 31, No. 1, Part 2 (Proc. Number), Feb. 1949, pp. 553-62.

[14] J. M. Clark, "Toward A Concept of Workable Competition," *Amer. Econ. Rev.*, 30:241-56, June 1940.

[15] An especially good starting point is Stephen Sosnick's excellent article, "A Critique of Concepts of Workable Competition," *Quar. J. Econ.*, Aug. 1958. Other important articles include: Jesse W. Markham, "An Alternative Approach to the Concept of Workable Competition," *Amer. Econ. Rev.*, June 1950; George Stigler, "Extent and Bases of Monopoly," *Amer. Econ. Rev.*, June 1942.

structures, and (3) testing hypotheses relating to the kinds of firm conduct and industrial performance resulting from various kinds of structure.

Below we shall consider some of the potential research which might be done in each of these areas in the agricultural industries. It should be emphasized that considerable overlapping of these areas may occur in particular studies.

*Determination of specific market structure variables*

Research in this area is based either on the assumption (1) that empirical research already has verified that there are certain predictable relationships between particular characteristics of market structure on the one hand, and firm conduct and industrial performance on the other, or (2) that it is necessary to obtain certain basic structural information as background for subsequent research. We believe that either of these assumptions is a sufficient reason for determining the nature of the existing market structures.

There is little reliable empirical information of the basic market structure variables in the agricultural industries. Most work has been done on the market concentration variable, although even here the data are not entirely satisfactory, as indicated by the controversy over the seemingly simple question of whether or not market structures are becoming more concentrated.

Many studies have been made of the extent of concentration. Such studies have been of two main types: (1) the share of total economic activity accounted for by the largest firms in the economy, and (2) the share of an industry or product accounted for by the largest firms in the industry or producing the product.[16] These studies indicate that not only

[16] Gardiner Means did the pioneering work in over-all concentration in the economy, "The Large Corporation in American Economic Life," *Amer. Econ. Rev.*, 1931, and with A. A. Berle, *The Modern Corporation and Private Property* (New York, 1932).

Subsequent studies by the Federal Trade Commission and Adelman have analyzed further this aspect of industrial concentration. See FTC, *Report on the Concentration of Productive Facilities*, 1947, and Report of Subcommittee on Antitrust and Monopoly, *Concentration in American Industry*, 1957; M. A. Adelman, "The Measurement of Industrial Concentration," *Rev. Econ. and Stat.*, Nov. 1951.

The most recent FTC study found that in 1947 the 50 largest industrial firms accounted for 17 per cent and in 1954, 23 per cent of the sales of all industrial concerns. The respective percentages for the 200 largest concerns were 30 and 37.

The first comprehensive study of market concentration on the basis of industry classifications was done in 1939 by the National Resources Committee: *The Structure of the American Economy*, 1939. About the same time Willard Thorp made a similar study based on product, rather than industry, classification: W. L. Thorp and W. F. Crowder, "The Structure of Industry," T.N.E.C. Mono. No. 27. In subsequent years the Federal Trade Commission and others made similar studies. In 1951, G. Warren Nutter made an exhaustive study of changes in concentration between 1899 and 1939, *The Extent of Enterprise Monopoly in the United States, 1899-1939* (Univ. of Chicago Press, 1951).

is the American industrial economy quite concentrated, but it has been quite concentrated for at least half a century. Studies of other market economies indicate similar market characteristics.[17] Scattered evidence indicates that market structures of underdeveloped economies are even more concentrated than are those of the United States.[18]

Recent studies reveal that most agricultural supply and food processing industries also are characterized by a high degree of market concentration.[19] Although in recent years there has been no dramatic increase in the percentage of business done by the largest firms, there has been a substantial and continuing decline in the number of firms constituting the competitive fringe in these industries.[20] Similar changes are occurring in grocery retailing. But while grocery retailing has become very concentrated in local markets, in national markets grocery retailing is still much less concentrated than all but a few food processing industries.[21] Recent studies also have illustrated the nature and extent of diversification of food firms.[22]

Continuing research may profitably be done to keep abreast of the changes occurring in the market concentration, vertical integration, and diversification of the food industries. However, the market structure variables warranting the most extensive research in the future are those of product differentiation and barriers to entry. Relevant questions here are (1) how extensive is product and service differentiation in various agricultural supply and marketing industries, and (2) what are the nature and height of the barriers to entering various processing and distributing industries? These are essentially virgin fields for empirical research in the agricultural industries.

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[17] Gideon Rosenbluth, "Industrial Concentration in Canada and the United States," *Can. J. Econ. Pol. Sci.*, 22 (1954). H. Leak and A. Maizels, "The Structure of British Industry," *J. Royal Stat. Soc.*, 1945.

[18] Willard F. Mueller, "Some Market Structure Considerations in Economic Development," *J. Farm Econ.*, 41:414-32, May 1959; and Hugh L. Cook, "Market Structures and Economic Development in the Philippines," *J. Farm Econ.*, 41:1316-22, Dec. 1959.

[19] Robert F. Lanzilotti, "The Superior Market Power of Food Processing and Agricultural Supply Firms—Its Relation to the Farm Problem," *J. Farm Econ.*, 42:1228-47, Dec. 1960.

[20] Forrest E. Scott, "The Food Marketing Industries—Recent Changes and Prospects," *Marketing and Transportation Situation*, U.S. Dept. Agr., Nov. 1957; Willard F. Mueller, "The Changing Market Structure of the Food Industries," Fifth Ann. Agr. Mktg. Clinic, Mich. State Univ., March 10, 1959.

[21] Willard F. Mueller and Leo Garoian, *The Changing Market Structure of Grocery Retailing, 1940-58*, Wis. Agr. Expt. Sta. Res. Rept. 5, April 1960. Federal Trade Commission, *Economic Inquiry into Food Marketing, Part I. Concentration and Integration in Retailing*, Jan. 1960.

[22] Report of the Federal Trade Commission on *Industrial Concentration and Product Diversification in the 1,000 Largest Manufacturing Companies*, 1950. Imogene Bright, *Food Marketing Companies, Diversification and Structure*, Mktg. Res. Rept. No. 291, AMS, USDA, 1958.

Recent studies suggest that product differentiation efforts are becoming increasingly important in the food processing and distributing industries.[23] The Market Structure and Practices Section of the Marketing Economics Research Division, AMS, USDA, currently has a study underway aimed at obtaining more precise data on changes in the extent of advertising by various food industries. More exhaustive studies are needed, however, in order to gain a more comprehensive picture of the importance of this variable.

No over-all study has been made of barriers to entering the food industries. Such studies might concentrate on particular variables, such as economies of plant size in various food industries. Bain's cross sectional approach, if not his particular methods of measurement, holds much promise.[24]

*Analysis of the various bases of market structures*

This area of research encompasses those factors which give rise to particular market structures, and may be considered one of the most dynamic and potentially most fruitful areas of analysis. Here we are concerned with such basic questions as what technological, merchandising, and other economies explain the size of firms and consequently the structure of markets and over-all organization of industry.

Some particularly relevant areas of inquiry include:

1. Analysis of the changing magnitude of various technological, distribution, financial, advertising, legal, and other economic factors which act as barriers to entering agricultural processing and distributing industries. The early works of Nicholls demonstrated the importance of patents as barriers to entering certain fields.[25] Although the extensive research studies into economies of scale in various food processing industries have been motivated largely by concern over operating efficiency,[26] they should

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[23] Mueller and Garoian, *op. cit.* Roberta Lamb, "The Cost of Advertising in Food Marketing," *Marketing and Transportation Situation,* USDA, January, 1960, pp. 41-42, and "Advertising Expenditures by Food Manufacturing Corporations," *Marketing and Transportation Situation,* July, 1960, pp. 37-39.

[24] Bain, *Barriers to New Competition, op. cit.*

[25] *Postwar Developments in the Marketing of Cheese,* Iowa Agr. Expt. Sta., Res. Bul. 261, 1939; and "Some Economic Aspects of University Patents," *J. Farm Econ.,* 21:494-98, 1939.

[26] For example, James N. Boles, "Economies of Scale for Evaporated Milk Plants in California," *Hilgardia,* Univ. of Calif., Oct. 1958, pp. 621-722; Scott H. Walker *et al., An Economic Analysis of Butter-Nonfat Dry Milk Plants,* Idaho Agr. Expt. Sta., Res. Bul. No. 20, June 1953; J. R. Frazer *et al., The Cost of Manufacturing Butter,* Iowa Agr. Expt. Sta., Res. Bul. 389, June 1952; M. C. Commons *et al., An Economic Analysis of Model Plants for Pasteurizing and Bottling Milk,* Va. Agr. Expt. Sta., Bul. 484, June 1957; a study presently underway at Nebraska in analyzing the way in which changes in economies of scale in bread baking may affect the market structure of the baking industry.

provide an invaluable aid in analysis of the changing barriers to entry in various food industries. Similarly, the distribution efficiency studies of Bressler, Clarke, and others[27] should provide techniques as well as valuable empirical data useful in analyzing the impact of distribution economies on market structure.

2. Analysis of factors tending to act as barriers to exit from the agricultural industries. This area of analysis, while obviously a part of the barriers to entry problem, deserves special attention in many food processing industries where new technology and other factors require the egress of many firms. The process by which such egress occurs is a virgin field of empirical study.

3. Analysis of the changing financial, managerial, technological and other forces favoring vertically integrated operations within the agricultural industries, from the farm level through to distribution.

Although much valuable theoretical and empirical work has been done on vertical integration, much more needs to be done in this area.[28] Theoretical writings of others can provide many useful ideas and insights to students of market structure in building models of their own.[29]

Most studies of agricultural industries have dealt mainly with the technical economies of integrated activities or processes, thereby ignoring the market structure considerations which appear to be among the leading causes for integration in the rest of the economy. Also, to date most studies have been oriented to particular industries, especially broilers. Such an industry approach is apt to lead researchers to mistake the unique reasons for integration in the industry studied. It appears that a more fruitful approach would involve studies which cut across several industries; such cross-sectional analysis should permit isolation of the

[27] R. G. Bressler, Jr., *City Milk Distribution*, Harvard Univ. Press, 1952; D. A. Clarke, *Milk Delivery Costs and Volume Price Procedures in California*, Calif. Agr. Expt. Sta., Bul. 757, Dec. 1956.

[28] The following articles on vertical integration have appeared in *J. Farm Econ.*: Stanley K. Seaver, "An Appraisal of Vertical Integration in the Broiler Industry," 39:1487-99, Dec. 1957; Willard F. Mueller and Norman Collins, "Grower-Processor Integration in Fruit and Vegetable Marketing," 39:1471-86, Dec. 1957; H. K. Leckie, "Dynamics of the Integration of Agricultural Production and Marketing," 40:1356-69, Dec. 1958; R. C. Engberg, "Credit Implications of Integration in Agriculture," 40:1370-82, Dec. 1958; Raymond J. Penn, "Tenure Innovations and the Tenure Problems Associated With Vertical Integration," 40:1383-92, Dec. 1958; Emery N. Castle, "Vertical Integration and Farm Management Research," 40:434-38, May 1958; Raphael Trifon, "Guides for Speculation About the Vertical Integration of Agriculture with Allied Industries," 41:734-46, 1959.

[29] Especially valuable introductory reading are such classics as E. A. G. Robinson, *The Structure of Competitive Industry;* F. Levington, "Technological Influences on Vertical Integration," *Economica*, March 1927; George J. Stigler, "The Division of Labor is Limited by the Extent of the Market," *J. Pol. Econ.*, June 1951; Joe S. Bain, "Advantages of the Large Firm: Production, Distribution, and Sales Promotion," *J. Marketing*, April 1956.

truly unique factors giving rise to particular organizational characteristics.

4. The role of mergers as a means of bringing about dramatic and rapid changes in firm size and industrial structure. There have been many studies of the impacts of mergers on industrial organization.[30] To date, however, no comprehensive studies have been published of their importance in the food processing industries.[31] Ideally, this problem would involve analysis of the causes for mergers, the methods by which they are accomplished, and measurement of their impact on individual firms' growth and on industrial structure.

5. Analysis of the effect of legal and other institutional restraints on firm growth, and consequently on industrial structure. Here we are thinking of such things as the differential impact of the antitrust and tax laws, marketing orders, or government support programs on farmers and marketing institutions. The tax laws have not only had an effect on mergers but on other aspects of corporate and cooperative life. Government policies with respect to subsidies of various kinds, and with respect to purchases and to sales, all have repercussions on market structure and merit investigation within a market structure framework.

6. Analysis of the importance of the level of market knowledge as a structural element. As Ozga has indicated[32] this question has not been seriously investigated. While it has been recognized that knowledge was not perfect, the consequences of varying degrees of knowledge on firm conduct and subsequent industrial performance has never been elaborated.

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[30] An extensive literature has been developed in this field. Among the most important studies are: Shaw Livermore, "The Success of Industrial Mergers," *Quar. J. Econ.*, Nov. 1935, pp. 68-96; *Report of the Federal Trade Commission on the Merger Movement, A Summary Report,* 1948; Federal Trade Commission, *Report on Corporate Mergers and Acquisitions,* 1955; Willard F. Mueller, "The F.T.C.'s Report on Mergers with Special Reference to the Dairy Industry," *J. Farm Econ.*, 39:140-52, Feb. 1957; J. K. Butters *et al., Effects of Taxation: Corporate Mergers,* Harvard Univ. Press, 1951; Jesse W. Markham, "Survey of the Evidence and Findings on Mergers," *Business Concentration and Price Policy,* Natl. Bu. Econ. Res., 1955; G. Stigler, "Monopoly and Oligopoly by Merger," *Amer. Econ. Rev.*, May 1950, pp. 27-31; J. Fred Weston, *The Role of Mergers in the Growth of Large Firms,* Univ. Calif. Press, 1953; Ralph L. Nelson, *Merger Movements in American Industry, 1895-1956,* Princeton Univ. Press, 1959.

[31] The most comprehensive such study to date is, Paul E. Nelson, Jr., "Ownership Changes by Purchase and Merger in Selected Food Industries," Mktg. Res. Rept. No. 369, USDA, 1959. Nelson is conducting additional research in this area. A study is presently underway at Wisconsin analyzing the impact of mergers on the structure of the dairy industry. The study also attempts to isolate through multiple regression analysis the causes for merger cycles between 1919 and 1957. Another study to be published soon deals with the extent and causes of mergers among farmer cooperatives: Willard F. Mueller, *The Role of Mergers in the Growth of Agricultural Cooperatives,* Calif. Agr. Expt. Sta. Bul. 777, Feb. 1961.

[32] S. A. Ozga, "Imperfect Markets Through Lack of Knowledge," *Quar. J. Econ.*, Feb. 1960.

At the present time in agriculture, considerable resources are devoted to price and market reporting. Much of this information is highly aggregated, and relates to markets that are not realistic alternatives for farmers in particular areas. In the absence of critical research results, the provision of market information on a wide-scale basis can be justified on the assumption that more information produces better conduct and performance than less information. It is clear that a change in structure from the theoretically "pure" to the theoretically "perfect" improves conduct and performance. It is reasonable that changes in the degree of market knowledge between sellers and buyers and among sellers and among buyers can have substantial effects on structure itself, on conduct and on performance. It is not known what these effects might be or are in fact.

Sophisticated analysis requires recognition that knowledge functions also as a response to structure. One of the aspects of the conduct of firms may be to supply (1) perfect information, (2) partial information, (3) no information, or (4) misinformation as part of the dealings, tactics, or strategies of the firm. This is more than an advertising response and utilizes other channels of communication than the mass media. An example in the procurement of milk for processing by dairy plants is the use of fieldmen. Nominally the field staff works on milk quality problems. However, they can and do solicit patrons on the basis of price, test, integrity, and so forth, at their own and competing firms. Manipulation of the information that goes to farmers is part of the firm's conduct. On the structural side, the feature of note is that dairy plants as buyers have accurate price knowledge. Farmers as sellers have markedly poor information.[33]

*Analysis of the relationship between market structure and industrial performance*

All aspects of market structure analysis rest on the basic assumption that market structure determines, in large part, the competitive conduct of firms in a market which in turn generates certain forms of industrial performance. But while market structure theory posits certain causal relationships between market structure and performance, much of this theory is still untested. Therefore, a major area of market structure research involves testing hypotheses as to the relationship between market structure, firm conduct, and industrial performance.

Often in this area of research, accepted market structure theory will provide only the broad framework within which empirical work will be done. The researcher will necessarily be compelled to formulate some hypotheses of his own as suggested by his tentative conceptualization of

[33] Claron Burnett and Robert L. Clodius, *Procurement Policies and Practices of a Selected Group of Dairy Processing Firms: Part 3, Farmer Knowledge and Evaluation of Price and Nonprice Factors*, Wis. Agr. Expt. Sta., Bul. 211, May 1959.

certain relationships. Completed studies in this area should prove helpful in formulating meaningful hypotheses.[34]

Among the important problems in this area which might be considered are the following:

1. The relationship between market structure in different industries and their relative profitability.[35] Such a study would attempt to explain the way in which differences in the market structures of different industries determine differences in their profitability. This would include the agricultural processing and distributing industries, as well as farming itself. The latter would involve an attempt to explain differences in income among producers of different farm products in terms of differences in market structures.

2. The relationship of advertising expenditures to market structure and industrial behavior in the agricultural processing and distributing industries. The relative extent of advertising expenditures provides an indication of the costs involved in bringing about transfer of ownership in imperfectly competitive markets. Consequently, the magnitude of such expenditures engendered by different structures may become a crucial measure of industrial performance.[36]

3. The relationship between market structure and the extent to which an industry induces technological change.[37] Since the improvement of

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[34] A. C. Hoffman, *Large Scale Organization in the Food Industries*, T.N.E.C. Mono. No. 35, 1940; William H. Nicholls, *Price Policies in the Cigarette Industry*, Vanderbilt Univ. Press, 1951; Robert L. Clodius *et al.*, *Procurement Policies and Practices of a Selected Group of Dairy Processing Firms: Part 1. Some Aspects of Market Structure, Competitive Behavior, and Market Results*, Wis. Agr. Expt. Sta. Res. Bul. 193, Jan. 1956; *Part 2, Managerial Aspects of Price and Nonprice Competitive Behavior Among Nine Dairy Processing Firms, idem*, Bul. 199, Feb. 1957; *Part 3, Farmer Knowledge and Evaluation of Price and Nonprice Factors, idem*, Bul. 211, May 1959; Homer C. Evans, *The Nature of Competition Among Apple Processors in the Appalachian Area*, W.Va. Agr. Expt. Sta., Bul. 405, June 1957; W. G. Phillips, *The Agricultural Implement Industry in Canada, A Study of Competition*, Univ. of Toronto Press, 1956; Jesse W. Markham, *The Fertilizer Industry: Study of An Imperfect Market*, Vanderbilt Univ. Press, 1958; Mueller and Garoian, *The Changing Market Structure of Grocery Retailing, op. cit.*; Willard F. Williams, "Structural Changes in the Meat Wholesaling Industry," *J. Farm Econ.*, 40:315-29, May 1958.

[35] Bain's empirical work on this subject suggests some interesting possibilities in this area: Joe S. Bain, "Relation of Profit Rate to Industry Concentration," *Quar. J. Econ.*, Aug. 1951. A Study of these relationships among food firms is currently underway by Lee I. Schrader and Norman R. Collins; see "Relation of Profit Rates to Market Structure in the Food Industries," *J. Farm Econ.*, 42:1526-7, Dec. 1960.

[36] See Bain, *Industrial Organization, op. cit.*, pp. 387-94. A current Wisconsin study is attempting to determine the relationship between advertising expenditures and changes in marketing structure of grocery manufacturing firms.

[37] Schumpeter's thesis concerning the relationship between market power and innovation (as well as the writings of his critics) provide the student interested in this area with many valuable leads. Vernon Ruttan, "Research on the Economics of Technological Change in American Agriculture," *J. Farm Econ.*, 42:735-54, Nov. 1960, summarizes this literature.

existing technology and development of new technology often is more important than the optimum utilization of existing resources, this is a crucial criterion of industrial performance. This area of research could include analysis of the way in which alternative market structures in agricultural supply and marketing industries promote technological advance in farming. An aspect of this could involve the effect alternative types of contract farming may have on technological development in agriculture.

4. The extent to which the market structure of farm-related industries determines income distribution between farming and such related industries.[38] This aspect of performance would deal with such problems as how various market structures determine the relative market position of farmers and their suppliers or buyers under contract-farming arrangements.

5. The relationship between market structure and income and/or production stability in one or more industries. Examples of research problems in this area would be the way in which vertically integrated market structures might contribute to greater production and/or income stability in various segments of the marketing system. An alternative would be to study this problem at just one stage of the marketing system, e.g., at the grower-processor level.[39]

6. The extent to which a vertically integrated marketing system brings about greater operating efficiency than less integrated marketing systems.[40] An example of this would be an analysis of the economies of direct buying under contract as opposed to central market operations.

7. The relationship between market information and industrial performance.[41] One determinant of product or service differentiation of firms is the relative degree of market information available to buyers and sellers. Therefore, a relevant area of research is the determination of the

[38] K. E. Boulding, "Does Absence of Monopoly Power in Agriculture Influence the Stability and Level of Farm Income?" *Policy for Commercial Agriculture,* Joint Economic Committee, 85th Cong., 1st Sess., Nov. 22, 1957; "The Significance of Industrial Organization and Market Structure to Development and Marketing Problems," *J. Farm Econ.,* 41:389-434, May 1959: Papers by J. W. Markham, Willard Cochrane, Willard F. Mueller, Walter Adams, N. R. Collins, and H. C. Trelogan; Robert L. Clodius, "Market Structure, Economic Power and Agricultural Policy: A Proposal for Forward Production Control," *J. Farm Econ.,* 42:413-25, May 1960; Lanzilloti, *op. cit.*

[39] Norman Collins, Willard F. Mueller, and Eleanor M. Birch, "Grower-Processor Integration," Calif. Agr. Expt. Sta., Bul. 768, 1959.

[40] Recent papers that attempt to develop models useful for such analyses are: W. R. Henry and Robert Raunikar, "Integration in Practice—the Broiler Case," *J. Farm Econ.,* 42:1265-74, Dec. 1960; and O. P. Blaich, "Integration in Theory With An Application to Hogs," *ibid.,* pp. 1280-93.

[41] See Paul L. Farris, "The Pricing Structure for Wheat at the County Elevator Level," *J. Farm Econ.,* 40:607-24, Aug. 1958. At Wisconsin, Clodius, Burnett and Morris have experimentally altered the level of information going to a select group of sellers and are currently analyzing the effect on firm's conduct.

way in which changes in the availability of market information may alter industrial performance. The role of information also might be given special attention with respect to requirements by buyers and sellers under various transfer arrangements, whether buyers or sellers tend to have a relative advantage, and whether improved information in itself may generate or hasten a change in market structure, conduct and performance.

8. Closely related to education and information programs, but of sufficient importance to warrant separate consideration, is the effect of uniform grades and standards on market structure, conduct and performance in particular situations, and the role of government with respect to uniform grades and standards.[42]

9. The impact of government intervention in agricultural market structures on various aspects of industrial performance. State or Federal marketing order programs may be studied to determine their effects on such performance criteria as operational efficiency, technological advance in farming and marketing, income stability, and income distribution.[43]

10. The effect of farmer cooperatives on industrial performance.[44] This would involve study of cooperatives within a market structure framework to determine the way in which they might help farmers best adjust to particular structures, bring about actual modification in existing structures, or the effects which alternative operating policies of cooperatives might have on marketing efficiency and farmer incomes.[45]

11. The impact of market structure on aggregate farm output and income. The distinct difference between the competitive structure of agriculture and nonagriculture gives rise to a major problem at the aggregate farm output and income level, and is an important ingredient in considering general farm price and income policy.[46] Problems of particular in-

[42] For a discussion of this subject see, Paul L. Farris, "Uniform Grades and Standards, Product Differentiation and Product Development," *J. Farm Econ.*, 42: 854-63, Nov. 1960.

[43] Although not conducted within a market structure framework, a recent USDA study analyzes the legal barriers to entry in fluid milk marketing. *Regulations Affecting the Movement and Merchandising of Milk*, Mktg. Res. Rept. No. 98, AMS, USDA, June 1955.

[44] A promising study of cooperative bargaining has been made by Sidney Hoos and Peter G. Helmberger at California (see abstract in Appendix II).

[45] Cf. Robert L. Clodius, "Opportunities and Limitations in Improving the Bargaining Power of Farmers," in *Problems and Policies of American Agriculture*, Iowa State Univ. Press, 1959; Willard F. Mueller, "Vertical Integration Possibilities for Agricultural Cooperatives," in Frank M. Bass (ed.), *The Frontiers of Marketing Thought and Sciences*, Columbus: Modern Art Company, 1958, pp. 204-15; E. Fred Koller, "Vertical Integration of Agricultural Cooperatives," and Joseph G. Knapp, "Cooperative Expansion Through Horizontal Expansion," *J. Farm Econ.*, 32:1031-58, Nov. 1950.

[46] For consideration of some of these structural differences see J. K. Galbraith, "Agriculture and Competitive Structure," and discussion by L. J. Norton, *J. Farm Econ.*,

dustries or market situations may, at least in part and in various ways, reflect structural problems of agriculture at the aggregate level. Some particular commodity supply, price and income problems cannot be solved except as they are a part of solutions to aggregate farm output and income problems.

One way of considering the aggregate problem is by explicitly hypothesizing that in order to obtain effective supply control in agriculture, some change or modification of the competitive structure of agriculture is required. Such control would need to come about essentially through the market structure dimension of the ease of entry or exit of resources to or from agriculture, including the intensity of resource use. Certainly, among the structural categories of numbers, product, and entry (exit), the most appropriate ones for investigation appear to be related to entry and exit.

## APPENDIX I. ABSTRACTS OF SELECTED BOOKS AND ARTICLES RELATING TO MARKET STRUCTURE ANALYSIS*

### *Books*

Chamberlin, E. H., *The Theory of Monopolistic Competition* (Cambridge, Harvard Univ. Press, 7th ed., 1956).

This book, one of the pioneer works in the area of market structure analysis, is devoted to a theoretical analysis and statement concerning the effect which the number of sellers in a market and the degree of differentiation of the product within a market have upon firm behavior. This analysis shows that as markets differ with respect to these characteristics, their price behavior will differ.

From this is derived a classification of markets with respect to degrees of competition in approximately the following manner:

(1) Markets with many sellers
  (a) Undifferentiated product (pure competition)
  (b) Differentiated product (monopolistic competition)
(2) Markets with few sellers
  (a) Undifferentiated product (pure oligopoly)
  (b) Differentiated product (differentiated oligopoly)
(3) Markets with one seller (monopoly)

Chamberlin shows how each market situation can be reflected in the position, shape, and behavior of demand curves. He also shows how firm and market or industry equilibrium positions might be achieved by the relation of these demand curves and their respective average cost, marginal revenue and marginal cost curves.

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36:743-50, Dec. 1954; Willard W. Cochrane, *Farm Prices, Myth and Reality* (Minneapolis: Univ. Minn. Press, 1958); Robert L. Clodius, "Market Structure, Economic Power and Agricultural Policy: A Proposal for Forward Production Control," with discussions by Boris C. Swerling and James T. Bonnen, *J. Farm Econ.*, 42:413-34, May 1960.

* Primary responsibility for preparing this section was carried by E. Fred Koller.

Triffin, Robert, *Monopolistic Competition and General Equilibrium Theory* (Cambridge: Harvard Univ. Press, 1940).

Triffin's purpose is to fuse the theories of monopolistic and imperfect competition with general equilibrium theory in an attempt "to carry the whole subject on into new and uncharted lands." This new land he names "The Theory of External Interdependence."

Triffin believes that monopolistic competition theory helps break down the industry into intra-industry firms, and as such a new theory of the interdependence between these firms and those of other industries is needed. His basic argument is that the meaningfulness of commodity-defined industries in value theory is voided by the introduction of monopolistic competition theory. Acceptance of this theory tends toward the conclusion that monopolistic competition is the most evident and most likely market structure in the present day economic world.

However, monopolistic competition is a composition of many monopolies not related commodity-wise into industries, for each has its own special product. Triffin recognizes that many firms produce similar and highly substitutable products, but how similar or substitutable the product of one firm should be to that of another in order to classify both firms in the same industry is the basic question.

Actually, Triffin believes that it is unnecessary and misleading to have industry classification, mainly because it does not take into account relationships between firms of different industries and important spatial problems (e.g., two firms producing similar products but located miles apart may not affect one another at all). Triffin offers a solution to this dilemma in his theory of external interdependence.

Nicholls, William H., *A Theoretical Analysis of Imperfect Competition with Special Application to the Agricultural Industries* (Ames: Iowa State College Press, 1941).

An important contribution of this book is the adaptation of the theory of imperfect competition developed by Chamberlin, Robinson, Triffin, and others to the buying side of agricultural processing and marketing industries. A perhaps equally important contribution is Nicholls' illumination of the inherent limitations of the analytical tools of imperfect competition theory in practical empirical research. Prior to the writing of this book, monopolistic or imperfect competition was developed mainly in relation of the selling side of the market. Nicholls' principal effort is directed at revising these theories to apply to the buying side of the agricultural industries. This he does in terms of various cases of monopoly-monopsony, oligopoly-oligopsony, bilateral monopoly, service and product differentiation, and price discrimination.

Overall, this book is of greatest value in market structure analysis for its adaption of the theories of imperfect competition to agricultural industries that previously were generally considered more purely competitive than Nicholls' analysis indicates.

Papandreou and Wheeler, *Competition and Its Regulation* (New York: Prentice-Hall, Inc., 1954).

The emphasis throughout the first half of this book (Book One, "Competition," pages 3-207) is on interplay between types of power relations in the market and types of firm behavior. The object is to develop a systematic formulation of the

analytical tools which are necessary for an understanding of the problems of regulation of competitive behavior.

Through the use of cross-demand and cross-supply schedules the "market group" is theoretically isolated. Then narrowing down to cross-sales and cross-purchases schedules three types of power relations are described which might prevail between two competitive firms: (1) atomistic, (2) circular, and (3) dominance.

Further refinement is made by the categorization of homogeneous and heterogeneous firm groups. This brings into consideration the products of firms being differentiated or undifferentiated.

Finally, a classification of types of behavior is offered: (1) independence, (2) horizontal coalitions, (3) vertical coalitions, (4) fusion, and 5) interference.

These types of behavior are evaluated in terms of three requirements for the maintenance of freedom of competition: (1) that entrance is free, (2) that no firm is coerced to withdraw from the market, and (3) that firms do not cooperate competitively against others.

Bain, Joe S., *Barriers to New Competition* (Cambridge: Harvard Univ. Press, 1956).

The author defines conditions of entry as "the state of potential competition evaluated roughly by the advantages of established sellers in an industry over potential entrant sellers, these advantages being reflected in the extent to which established sellers can persistently raise their prices above a competitive level without attracting new firms to enter the industry or market."

The following determinants of the conditions of entry are given: (1) absolute cost advantages, (2) product differentiation advantage, (3) significant economies of large-scale organization to established firms. Also given are six degrees of conditions of entry, ranging from "easy" to "blockaded."

The major part of the book is devoted to a partially empirical discussion of 20 industries, using the above principles and framework in analyzing conditions of entry as barriers to new competition.

Mason, Edward S., *Economic Concentration and the Monopoly Problem* (Cambridge: Harvard Univ. Press, 1957).

Chapter 18, "Workable Competition Versus Workable Monopoly" (pages 382-88), discusses the notion of workable competition as bringing to the fore a consideration of practicable limitations to changes in business practices and market structure. It raises questions concerning what the public wants and expects to get from the market organization of economic resources.

The standards of acceptable competition or unacceptable monopoly applicable in particular cases tend to be related both to the basic conditions under which goods are produced and sold, and to how the public interest is to be served.

What constitutes an acceptable competitive structure of a market will vary depending on which of the following are considered to be the primary objectives of public policy in the area of market structure and business practices:

(1) The maintenance of a large number of buyers and sellers,
(2) The prevention of a certain degree of concentration of economic and/or market power,
(3) Efficiency in the use of resources,
(4) The preservation of conditions of economic growth.

Chapter 19, "Market Power and Business Conduct" (pages 389-401) points to the expectation that the free enterprise competitive system will generate a set of powerful motivations and drives toward increased output, product improvement, cost reduction, and, in general, toward increased efficiency in the use of resources.

However, it is also expected of the competitive system that it will develop effective limitations to the growth of private economic power. It is in this context that efficiency is embraced, but economic or market power is rejected.

To rely on the market rather than on the social conscience of corporate management to give us the kind of business performance we want, the structure of markets must be such as to enforce acceptable competitive behavior. In other words there must be limits to the permissible degree of market power.

Bain, Joe S., *Industrial Organization* (New York: John Wiley and Sons, 1959).

This book represents the most comprehensive effort to delineate the field of market structure analysis. It is useful as a textbook for undergraduates or as a convenient introduction to anyone not familiar with this general area. Part I of this Report uses Bain's definitions and many of his other ideas.

*Articles*

Mason, Edward S., "Price and Production Policies of Large-Scale Enterprise," *AER*, March 1939, pp. 61-74.

Analysis of price and production policies requires consideration of the influence of the organization of the firm on the character of the firm's reaction to given market situations, and of elements of market structure, which include many more things than numbers of firms and product differentiation.

The economic problem in this connection is to explain differences in competitive practices through an examination of the structure of markets and the organization of firms. Variables worthy of primary attention are (1) price, production and investment policies, (2) technological factors, (3) growth methods, and (4) the goals and motives of management relative to investors.

Clark, J. M., "Toward a Concept of Workable Competition," *AER*, June 1940, pp. 241-56.

This article is the pioneer work in the field of "workable competition." It presents a list of ten conditions as to the character of competition among and between firms in the same market or industry:

(1) The standardized or unstandardized character of the product.
(2) The number and size distribution of the producers.
(3) The general method of price-making.
(4) The general method of selling.
(5) The character and means of market information.
(6) The geographical distribution of production and consumption.
(7) The degree of current control of ouput.
(8) Variation of cost with varying size of plant or enterprise.
(9) Variation of cost with short-run fluctuations of output.
(10) Flexibility of productive capacity.

These conditions are to be taken into proper consideration in the following outline of types of competition.

I. Pure (rigorous, unmitigated) competition
   A. Perfect Competition
   B. Imperfect Pure Competition
II. Modified, intermediate or hybrid competition
   A. Standard products, few producers, free entry, but no exit without loss
   B. Unstandardized or quality products, "monopolistic competition"

Long-run considerations and short-run conditions are taken into account within this framework.

In a summary of the article this observation is made: "Where one of the conditions of perfect competition is absent, the presence of others may lead to greater rather than less imperfection. Favorable conditions appear to include a *sloping individual demand curve,* with some *uncertainty whether a reduction of price will be promptly met.*"

Nicholls, William H., "Reorientation of Agricultural Marketing and Price Research," *JFE,* Feb. 1948, pp. 43-55.

Nicholls proposes two broad, interrelated economic problems in agricultural marketing: (1) how efficient is the present marketing system? and (2) how competitive is its price-making? Such research should reveal (1) the basic factors which determine the actual level of prices, margins, costs, investment, employment and output in a market or industry; (2) the ways in which existing price policies and marketing institutions affect the interests of the farmer, wage earner, and general public; and (3) changes by which the performance of given markets and marketing agencies could be improved.

Both intra-firm relationships and inter-firm relationships between buyers and sellers, among buyers, and among sellers must be emphasized. Theories of markets, imperfect competition, consumption, production and uncertainty are relevant to this framework.

Considerable attention is given to research needs in local country and retail markets, and in central wholesale markets. Most relevant are two crucial issues on which the author calls for concentrated research effort in central wholesale markets:

(1) The extent to which large scale organization has led to nonaggressive price behavior, and

(2) The extent to which economies of scale have more or less offset any disadvantages stemming from increasingly oligopolistic market structures.

Markham, Jesse W., "An Alternative Approach to the Concept of Workable Competition," *AER,* June 1950, pp. 349-362.

Using the rayon industry as a typical oligopolistic industry, the author sets forth the actual economic, structural, and business conditions that exist. Small numbers of large producers, short-run price stability, the acceptance of price leadership, and economies of scale were the major characteristics of the industry encountered.

However, the absence of any significant product differentiation and the movement of prices both up and down over longer periods which closely follow conditions of supply and demand in the rayon market tend to indicate that the industry was "workably competitive."

Fellner, William, "The Influence of Market Structure on Technological Progress," *QJE*, Nov. 1951, pp. 556-77.

This article analyses the rate of economic progress through technological advances (inventions and know-how). Open and blocked entry, and expectations and flow variations of innovations are variables.

The conclusions are that the consequences of either a single or constant flow of foreseen or unforeseen inventions depend on the conditions of entry. This is when new technologies are equally available to all firms in the industry or market.

As a final note the author discusses the case of limited availability of inventions (the patent problem). Limited availability constitutes a barrier to entry in itself, and therefore must be considered as a further consequence of the main part of the analysis.

Bishop, Robert L., "Elasticities, Cross-Elasticities, and Market Relationships," *AER*, Dec. 1952, pp. 779-804.

Bishop directs his discussion, first, toward differences and confusion in Triffin and Chamberlin with respect to the use and interpretation of cross-elasticities in market classification. Secondly, he proposes that what he calls "own" elasticities of firms should also be used in classifying markets with respect to their competitiveness. Bishop is interested in market classification rather than market delineation, and it is in this connection that he interjects the use of straight price and quantity elasticities both in place of and in addition to cross-elasticities, depending on the situation.

The classification of markets depends primarily on "the degree of substitutability of products, and the independence versus the interdependence of the business decisions of pairs of firms." It is Bishop's contention that substitutability as a determinant of the classification of competition in a market is best conveyed by the firm's "own" elasticity. However, with regard to independence and interdependence of business decisions of pairs of firms as a test of oligopolistic relationships among firms in a market, Bishop would use a coefficient of "own" elasticity over cross-elasticity.

Finally, Bishop produces a summarization of his "recommended" market classification system in terms of "own" elasticity and the above-described coefficient. He points out, however, that his system falls short in classifying cases of strictly homogeneous products. Classification of firms according to pure competition or pure oligopoly would depend on the standard direct measurement of the individual firms' share of the industry output.

Mason, Edward S., "The New Competition," *Yale Review*, Autumn, 1953, pp. 37-48.

Market power does not necessarily allude to bigness of the firm. A firm may be very large absolutely but be so diversified over relatively nonrelated fields that it has insignificant market power in any one field, industry, or market.

Market share is one of the important bits of evidence bearing on the market power of the firm. But it is not conclusive evidence and must be carefully interpreted together with other types of evidence. Such evidence might be:

(1) any and all close substitutes (e.g., steel with aluminum),

(2) new products and processes that are likely to be introduced if any profit opportunity becomes available by reason of monopoly prices changed by existing firms,

(3) the countering of big sellers by big buyers.

Heflebower, Richard B., "Toward a Theory of Industrial Markets and Prices," *AER*, Proc. issue, May 1954, pp. 121-40.

One major concern about markets where sellers are few, and particularly where a high proportion of costs are fixed in the short run, is whether equilibrium tendencies exist, and whether a determinate equilibrium is stable in the absence of collusion.

The author observes that few such markets seem disorderly in the absence of evidence of collusion. Arguments are given as to why this seems to be the case. The economic attributes of equilibrium in terms of the character of competition, market structures, and efficiency are the following:

(1) market characteristics of the product(s),
(2) influence of methods of production and structure of costs,
(3) the determinate market structure,
(4) conditions of effectiveness of entry,
(5) product-quality and cost-price effects of nonprice competition.

The firm's reaction to cost, price, and demand developments in its industry or market reflects the structural position in which it finds itself, and its relative market power position.

Arant, Willard D., "Competition of the Few Among the Many," *QJE*, Aug. 1956, pp. 327-46.

The article covers: (1) the measurement of concentration, (2) whether most industries are concentrated, (3) the difference between concentration and oligopoly, (4) the importance of conditions of supply, (5) the relationship between "ease of entry" and "elasticity of supply," (6) the agricultural program as an example of concentration, and (7) the relationship between oligopoly and the raising of prices.

The conclusions are that the existence of a few large firms in an industry, in itself, tells nothing about control of supply. That all firms be of atomistic size is a condition neither necessary nor sufficient for attaining competitive results in the long run. Elasticity of supply, not merely "ease of entry," is crucial to the question of market behavior. Oligopoly has no meaning that is not derived from control of supply by a few sellers.

Cochrane, W. W., "The Market as a Unit of Inquiry in Agricultural Economics Research," *JFE*, Feb. 1957, pp. 21-40.

A market is defined by the following identities:

(1) "Area of competitive behavior"—positively sloping cross-demand schedules between all possible pairs of firms.

(2) "Industry"—firms facing a similar totality of conditions such as technological, market and organization decisions of a similar structural pattern,

(3) "Market"—firms which are in both the same area of competitive behavior and the same industry.

"Market structure" refers to those elements and factors affecting the decision making of marketers which are peculiar to and significantly influential in the market itself.

Since the area of competitive behavior may cut across industry lines, the market of a firm may be smaller than both the industry and the area of competitive behavior to which it belongs. Of course the industry and area of competitive behavior may be the same size, and, therefore, likewise the market. The industry may be smaller than the area of competitive behavior and totally

contained within it, and vice versa. In this case the market would be the same as the industry or area of competitive behavior, depending on the case.

To quote Cochrane's summary: "In this view the single market does not stand alone as a determiner of either price or quantity; markets are related through the process of substitution, and beyond that areas of competitive behavior are linked together by the process of substitution."

Folz, William E., "Some Factors Inducing Changes in Marketing Cost-Structure and Practices," *Agricultural Marketing Research in the West, Report No. 1,* Western Agr. Econ. Res. Council, Comm. on Agr. Mktg. Res., Dec. 1957.

This paper is concerned with the questions: Why study market structures, what factors cause changes in market structures, and what research methods are appropriate to structural analysis?

The summary statement is as follows: "Structural research involves more and more an understanding and treatment of the market as a whole. Analysis of market structures will not have theoretical and statistical tools readily at hand. Greater dependence will be upon the researchers ingenuity and adaptability in applying at the time such studies are made. Good market researchers will have to know more about market agents and functions than has been true in the past, especially those operations further removed from the producer. The market researcher will not be adequately trained if all he has by way of preparation is a knowledge of economic theory and a few sophisticated econometric models to apply. He must also have a broad knowledge and experience in all aspects of marketing."

## APPENDIX II. CASE ILLUSTRATIONS OF RECENT EMPIRICAL STUDIES INVOLVING MARKET STRUCTURE ANALYSIS OF AGRICULTURAL INDUSTRIES

R. L. Clodius, D. F. Fienup, R. L. Kristjanson, and Claron Burnett, *Procurement Policies and Practices of a Selected Group of Dairy Processing Firms,* Wis. Agr. Expt. Sta.: Part 1, "Some Aspects of Market Structure, Competitive Behavior, and Market Results," Res. Bul. 193, Jan. 1956; Part 2, "Managerial Aspects of Price and Non-Price Competitive Behavior Among Nine Dairy Processing Firms," Res. Bul. 199, Feb. 1957; Part 3, "Farmer Knowledge and Evaluation of Price and Nonprice Factors," Res. Bul. 211, May 1959.

The objective of this continuing series of studies is to determine the relationships between various market structure variables and the conduct of buyers and sellers.

Forty-nine dairy processing firms and their farmer patrons in a contiguous geographic area in northwestern Wisconsin were initially selected for study. The structural elements considered were number of firms, size of firms, type of product, type of ownership, financial status and seasonal utilization of plant capacity.

Firm conduct was determined in terms of price levels and price policies, implicit price and nonprice practices. Conduct leading to higher relative prices paid farmers by specific firms was found to be associated with a larger number of firms competing, small size, cheese as the product, independent proprietorship, very poor financial rating, and a good seasonal utilization of milk.

Consideration of aggregate conduct among firms revealed nonaggressive "average" pricing policies and use of a wide variety of implicit price and nonprice practices. Further interviews in depth with managers of nine firms revealed in greater detail the strategies and consideration of mutual interdependence that underlay such conduct.

The perception of the market and information about market factors was found to be greatly different between buyers (dairy processing firms) and sellers (dairy farmers). The degree of market knowledge possessed by buyers was generally complete and accurate, while the opposite was true of sellers.

This difference in the structure of knowledge explained in large part the conduct of buyers in recruiting patrons and the consequent behavior of sellers. Market knowledge was seen to function both as structure in conditioning conduct and as a feature of conduct itself among buyers of milk. Keeping farmer patrons confused on information and knowledge about price was a consistent strategy for firms who wanted price de-emphasized as a competitive variable and nonprice factors emphasized.

Homer C. Evans, *The Nature of Competition Among Apple Processors in The Appalachian Area,* W.Va. Agr. Expt. Sta. Bul. 405, June 1957.

Processors are an important outlet for apples in the Appalachian Area, and concern as to the amount of competition among them exists. The objective of this study is to determine the nature and the amount of competition among apple processors in this area.

The analysis of this problem is approached by setting up criteria for identifying the firms included in the groups where price is established. The price-making unit, or market sub-group, is classified into rather general categories on the basis of factors which affect the competitive pressure in a market sub-group: namely, power relations, ease of entry for new firms, and the presence or absence of a cooperative firm.

An analysis is made of national production and of the utilization of apples, with emphasis on the Appalachian Area's part in the national situation. There follows a delineation of the market sub-groups in the area and an identification and a description of the processor firms.

A description of the operating policies and of the conditions confronting processors is given, and an interpretation of processor behavior in terms of competitive pressure is made.

The Appalachian Area produces about one-fifth of the national commercial apple crop. Production has been declining both in the United States and in the Appalachian Area. Nevertheless, sales to processors have increased during the past 20 years. The production of sauce and slices has expanded, especially the production of sauce. In the Appalachian Area approximately one-half of the crop has been sold in recent years to the processor outlet; and about one-half of the national production of sauce and slices is produced here.

A few processors (six) do most of the apple processing in the area; and two of these process approximately one-half the total volume. One of the two largest firms generally announces an opening price for apples, and all other firms follow with similar if not identical prices. These conditions, taken alone, suggest the possibility of more profits and less output than would be the case under perfect competition, assuming that costs are the same under both perfect and imperfect competition.

The evidence tends to support the thesis that both the derived demand for apples and the supply of apples facing the sub-group are elastic. Also, the

limited data available indicate that processing costs per unit do not vary within the present range of processor capacities.

An effective cooperative firm is present, which returns to its patrons all receipts over costs of operation. Other firms meet this competition by paying bonuses to their suppliers. These added returns encourage apple growers to sell more apples to the processors. Implicit price deals are used widely by processors and cause them to ignore, at least in part, their mutual dependence and to compete among themselves.

The entry of new firms into the sub-group is relatively easy; three firms have entered since 1939 and in recent years have been doing between one-fourth and one-third of the total processing in the area.

From this analysis of the situation, it is concluded that the opportunity for excess profits among apple processors has been reduced in recent years. The evidence indicates that competitive pressure is strong among processors, and that there is little opportunity for excess profits over a period of time.

Peter Helmberger, "Cooperative Bargaining in Agriculture," thesis on file in Univ. of California Libr., 1961.

This dissertation presents the results of a study of cooperative bargaining in agriculture with special reference to that sector producing fruits and vegetables for processing. Involved is a comprehensive review of the institutional and economic nature of cooperative bargaining associations and an economic analysis of their consequences in the production and distribution of processed fruits and vegetables.

Through the organization of cooperative bargaining associations in a legal environment specified by state and federal legislation governing agricultural cooperation, fruit and vegetable growers bind themselves together in order to increase their market power and achieve various objectives. These associations are designed to be democratically controlled by members and are financed in a variety of ways, including product retains and processor-service charges. Cooperative bargaining is a form of horizontal integration through which growers pass control of the sale of their output to cooperative bargaining associations. Although these associations provide growers with numerous services, their major objective is the enhancement of grower returns through bargaining and negotiation of contract terms with fruit and vegetable processors.

The research methodology employed in assessing the economic consequences of cooperative bargaining reflects the market structure-conduct-performance schema contained in price theory. On the basis of the peculiar economic nature of bargaining cooperatives, which were viewed as structural dimensions of processor-grower markets, it is concluded that monopsonistic buying on the part of processors is a necessary condition for the existence of potential gains to growers in terms of increased returns through cooperative bargaining. This conclusion is pegged on the voluntary nature of bargaining cooperatives and their inability to control the production of member and non-member growers.

A study of market structure, conduct, and performance of the fruit and vegetable processing industry suggests that this industry is substantially competitive in the procurement of raw fruits and vegetables and in the sale of final output. Local processor-grower markets are generally characterized by the presence of dominant processor-buyers; a fringe of numerous, relatively small processors; relatively low barriers to entry; a lack of product differentiation; grower cooperative processing plants; and, occasionally, highly competitive

fresh market outlets. In view of the observed structures and other supporting evidence, it is concluded that in the absence of cooperative bargaining processor-buyer behavior would embody barometric price leadership of a substantially competitive variety.

Through an alteration in the terms of trade between processors and growers, cooperative bargaining can result in modest, if not highly substantial, long-run gains in grower returns. Other benefits accrue to growers, however, through the provision of cooperative services aimed at decreasing costs of production, improved marketing, and improved contractual relationships between processors and growers.

John R. Moore, "Market Structure and Competitive Behavior in the Dairy Industry—The Present State of Knowledge," thesis on file in Univ. of Wis. Libr., 1959.

This thesis concerns the structure of the markets for the six major dairy products and the competitive behavior of firms within them. The first portion of the study concerns the changing number and size of firms processing and distributing dairy products on the national level. The second portion is concerned more with competition on the local level.

The principal sources of material used in the thesis are government documents, experiment station and U.S. Department of Agriculture research bulletins and personal interview surveys. The analysis of the material is in the framework of market structure theory. Fellner's joint-profit maximization model proved the most useful in analyzing competition at the firm level. Some of the more important findings of the study follow.

The dairy industry has been changing rapidly. Since 1940 the number of milk producers in the United States has declined 37 percent, but production per farm is up 56 percent. Producer cooperatives have increased their relative size considerably. Like the number of dairy farms, the number of processing plants of nearly all types has declined, but their average size in most cases has increased considerably. Some of the principal reasons for these changes have been: changes in technology, changes in the number and size of buyers, changes in laws and regulations, increasing labor costs, reduction of overhead costs, and instability of single proprietorships.

The largest firms in the dairy industry have been growing faster, relatively, than the industry. A significant portion of this growth is attributable to mergers. These mergers have public policy implications and some are currently being investigated by the Federal Trade Commission.

The markets for all dairy products are found to be imperfectly competitive in the classical sense. In most cases, however, a fairly high degree of rivalry is found among firms because of the difficulties of collusion. The principal factors found to be preventing collusion are: non-uniform cost curves between firms, excess capacity of plants, presence of cooperatives in markets, buying power of large chain stores, differences in brand acceptance, antitrust laws, ability to secretly discriminate on price, and the desire by firms for long-run expansion.

Several public policy suggestions are offered to improve competition in the dairy industry. Some are designed to increase competition and others to keep it running in proper channels. The suggestions include: better price reporting, passage and use of the premerger notification bill, more vigorous enforcement of antitrust laws, particularly those designed to prevent price discrimination, allowing private parties to bring suits under section three of the Robinson-

Patman Act, limitations on the good faith exemption in price discrimination cases, a second look at minimum retail markup laws, reduction of artificial barriers to entry into markets by outside firms, aid to small business, easier and more expeditious cease and desist orders, greater originality to obtain patents, and measures to increase trading on the commodity exchanges.

Willard F. Mueller and Leon Garoian, "Changes in the Structure of Grocery Retailing, 1940-1958," Res. Rept. 5, Univ. of Wis. Agr. Expt. Sta., Apr. 1960.

The authors' objectives in this study were to: (1) measure the broad changes which have occurred in the market structure of food retailing since 1940; (2) study some of the methods of growth involved in bringing them about; (3) draw some theoretical inferences as to the impact of these changes in market structure on current and prospective competitive behavior and performance in food retailing and allied industries.

The study presents data and analysis on the degree of buyer and seller concentration in terms of the number and size distribution of sellers and buyers at the national level, in regional markets, and in local markets. Legal ties among grocery chains, horizontal mergers, and vertical integration of grocery retailers are given due consideration. Motives, methods and impacts of changes in these various factors are discussed.

The extent to which firms sell identical or differentiated products and the ease with which new firms can enter the relevant market are analyzed. The implications of the variables are studied in terms of the local, regional and national market structures of the industry. The effects of the market position of retailers relative to manufacturers in terms of private retail labeling, chain manufacturing, and private chain label selling are considered.

Some of the general conclusions and observations of the study of the grocery retailing industry's performance are:

1. Although there has been some concentration, the industry still pretty much conforms to the classification of large numbers on the national scale.
2. However, there is good evidence that market concentration is quite high at the local market level, with the possibility of some isolated monopoly power.
3. On the other hand, some measures indicate that firms may be performing competitively in a more satisfactory manner than in earlier years. However, these measures are admitted to be of limited conclusiveness, in particular time series on profit shares of marketing margins.
4. The chains have increased their efforts to differentiate their products through private labeling.
5. Promotional advertising has greatly increased as a per cent of sales, thus intensifying non-price competition in the industry.
6. Total promotional expenses have become larger and larger relative to expenditures on research aimed at product and process discovery, development, and improvement.

Richard G. Walsh and Bert M. Evans, *The Baking Industry 1946-58, Economic Determinants of Changes in Market Structure, Firm Behavior and Industrial Performance,* Univ. of Nebr. Agr. Expt. Sta. and Mktg. Econ. Res. Div., USDA, cooperating (in process).

The objectives of this report are to describe and analyze changes in: (1) the structure and organization of the bread industry, primarily since 1946; (2) prin-

cipal technological-cost factors associated with combination-integration; (3) the related price and non-price practices of firms; and, (4) the impact of these variables on industrial performance, particularly production, distribution and selling costs.

Oligopoly theory with appropriate modifications relevant to the baking industry is the theoretical framework for analysis. The principal sources of information are: the U. S. Census of Manufactures, 1947, 1954 and 1958; congressional hearings and government reports; mail questionnaires; direct interviews; and, engineering-accounting studies.

Although bread is essentially a homogeneous product and the industry is composed of more than 5,000 firms at the national level, it does not conform to the competitive model at the market level. Perishability and bulk of the product result in 80-100 semi-independent bread markets. Producers are moderately to highly concentrated. The largest four firms account for approximately 65 percent (range 46-92) of total sales in sample markets. Entry is effectively blockaded to other than integrated corporate and voluntary grocery chains—whose potential entry is much greater than current levels (10 percent), due largely to economies in distribution and selling. The primary barriers to entry of new firms are: inelastic and static demand conditions, unfavorable terms under which outlets for the product are available, and economies of scale in production and distribution.

Technological advance in bakery equipment has increased the economic scale of bread production. Key advances are in automatic handling, oven firing and continuous dough mixing. Economies are sizeable as average unit production costs show a continuous decrease through the relevant range of technology, utilization and scale considered. For the model plants synthesized, average unit costs range from 11.7 cents per pound for a 2,000 pound per hour plant with standard equipment operating 36 hours a week, to 6.6 cents per pound for an 8,000 pound per hour plant with continuous mix equipment operating 108 hours a week. Estimated economies are also large in distribution and selling. Average costs for the industry decrease from about 6 cents (14.7 for house-to-house delivery) to 1.5 cents per pound over the range of division of labor, volume per route, volume per delivery and length of route considered.

Wholesale baking companies generally practice cost barometric pricing along with dominant firm price leadership in large city markets. This results in uniform and umbrella pricing to cover average unit costs of all members of the oligopoly group. The principal exception to this practice is the differential pricing behavior of large city firms encroaching upon outlying market areas. In this case the invading firm does not allow price to rise with the general trend of increased costs in the industry, and as the most severely squeezed firms leave the market their share is absorbed by the large-city firm.

Price collusion is infrequently discovered in bread markets. Various hidden price tactics, such as price discrimination and secondary line pricing of controlled and private label contracting, have increased. The rapid increase in non-price competition, including massed display, advertising, and product variation, is an attempt to retain or gain market share without engaging in destructive price competition.

Within the context of the unique product, structural, cost and organizational aspects of the industry, the ultimate result of firm behavior is industrial performance. This performance has many facets, each of which is an integral part of the various other aspects of performance:

1. There has been rapid technological advance and adoption along with the secular development of excess capacity (estimated at 40-60 percent).
2. Per unit distribution costs have increased substantially despite potential economies of distribution.
3. There has been a marked increase in selling costs with little or no impact upon aggregate demand or share distribution among the oligopoly group.
4. The market share of the small firm fringe has declined and small firm failure has occurred.
5. Umbrella pricing to cover a variety of plant sizes and efficiencies has resulted in profit levels above normal competitive levels in some cases.
6. Under uniform pricing, homogeneous product and the nature of shelf space competition, quality improvement has been very limited.
7. As a response to both increased capacity and grocery chain integration into baking, members of the large city oligopoly core have encroached upon outlying market areas.
8. Large city bakers have practiced differential pricing and other non-price share-gaining techniques in outlying market areas beyond those practices common within the oligopoly core of large city markets.
9. Grocery chain firms have become highly concentrated buyers as well as vertical integrators in the baking industry.
10. Grocery chain firms have achieved marked distribution and selling efficiencies without, however, consistently passing on these to the consumer in the form of higher quality or lower price.
11. A degree of bilateral oligopoly behavior has developed between the wholesale baking oligopoly core and the oligopoly core of grocery chain firms, in which grocery chain firms generally follow in both price and quality. The price differential more nearly reflects general grocery chain price policy rather than existing production, distribution and selling costs.

## APPENDIX III. PUBLICATIONS REPORTING MARKET STRUCTURE RESEARCH IN AGRICULTURAL INDUSTRIES

The following list of publications was compiled from information received from all experiment stations and the USDA in 1960. Each institution was requested to report publications recently completed in the area of market structure research.

Andrews, R. A., *A Study of the Sweet Corn Industry in the Midwest Farm Economy,* Minn. Agr. Exp. Sta. Tech. Bul. 232, June 1959.

Baker, George L., Jr., Abstr. of Ph.D. thesis, *The Structure of the U.S. Meat Industry,* Purdue Univ., June 1960.

Blaich, O. P., "Integration in Theory With An Application to Hogs," *J. Farm Econ.,* 42:1280-93, Dec. 1960.

Blaich, O. P., "Vertical Integration in Theory," Unpub. Ph.D. thesis, Univ. of Minn., 1961.

Burnett, Claron, and Robert L. Clodius, *Procurement Policies and Practices of a Selected Group of Dairy Processing Firms: Part III. Farmer Knowledge and Evaluation of Price and Nonprice Factors,* Wis. Agr. Exp. Sta. Res. Bul. 211, May 1959.

Clodius, Robert L., "Market Structure, Economic Power and Agricultural

Policy: A Proposal for Forward Production Control," *J. Farm Econ.*, 42: 413-25, May 1960.

Clodius, Robert L., "Opportunities and Limitations in Improving Bargaining Power of Farmers," *Problems and Policies of American Agriculture*, Iowa State Univ. Press, 1959.

Clodius, Robert L., Darrell F. Fienup, and R. Larry Kristjanson, *Procurement Policies and Practices of a Selected Group of Dairy Processing Firms: Part I, Some Aspects of Market Structure, Competitive Behavior, and Market Results*, Wis. Agr. Exp. Sta. Res. Bul. 193, Jan. 1956.

Clodius, Robert L., Darrell F. Fienup, and R. Larry Kristjanson, *Procurement Policies and Practices of a Selected Group of Dairy Processing Firms: Part II, Managerial Aspects of Price and Non-Price Competitive Behavior Among Nine Dairy Processing Firms*, Wis. Agr. Exp. Sta. Res. Bul. 199, Feb. 1957.

Collins, Norman R., "Structure of Agricultural Marketing Cooperatives," *American Cooperation, 1959.*

Collins, Norman R., "Discussion: Cooperatives and Vertical Integration," *Proc. of the Western Agr. Econ. Res. Council*, Dec. 1959.

Collins, Norman R., Willard F. Mueller, and Eleanor M. Birch, *Grower-Processor Integration: A Study of the California Canning Tomato Industry*, Berkeley, Univ. of Calif., Agr. Exp. Sta. Bul. No. 768, Oct. 1959.

Collins, Norman R., "Discussion: Changing Structure of the American Economy; Its Implications for the Performance of Agricultural Markets," *J. Farm Econ.*, 41:429-32, May 1959.

Cook, Hugh L., "Observations on Market Structures and National Economic Development in the Philippines," *J. Farm Econ.*, 41:500-18, Aug. 1959.

Evans, Homer C., "The Nature of Competition Among Apple Processors in the Appalachian Area," W.Va. Agr. Exp. Sta. Bul. 405, June 1957.

Farris, Paul L., *The Pricing Structure for Poultry and Eggs at the First Assembly Point in Two Indiana Areas*, Mimeo. Rept., Purdue Agr. Exp. Sta., May 1956.

Farris, Paul L., "Marketing Extension and Competitive Structure," *J. Farm Econ.*, 38:597-602, May 1956.

Farris, Paul L., "The Pricing Structure for Wheat at the Country Elevator Level," *J. Farm Econ.*, 40:607-24, Aug. 1958.

Farrish, R. O. P., and S. K. Seaver, *Factors Affecting the Output, Size, Costs and Location of Poultry Plants in Southern New England—1. Costs, Efficiency and Economies of Scale in Broiler Processing Plants*, Storrs Agr. Exp. Sta. Bul. 342, Sept. 1959.

Federal Trade Commission, *Economic Inquiry Into Food Marketing*, U.S. Gov't. Print. Off., Jan. 1960.

Frazier, Thomas L., J. H. Padgett, and J. C. Thompson, *Some Effects of Vertical Integration on Hog Marketing Practices in Georgia*, Ga. Agr. Expt. Sta., Mimeo. Ser. N. S. 100, May 1960.

Froker, R. K., A. W. Colebank, and A. C. Hoffman, "Large Scale Organization in the Dairy Industry," USDA Agr. Circ. No. 527, July 1939.

Henry, W. R., and Robert Raunikar, "Integration in Practice—The Broiler Case," *J. Farm Econ.*, 42:1265-74, Dec. 1960.

Hoffman, A. C., "Changing Organization of Agricultural Markets," *J. Farm Econ.*, 22:162-72, Feb. 1940.

Hoffman, A. C., *Large-Scale Organization in the Food Industries*, Mono. No. 35, U.S. Temporary National Economic Committee, 1941.

Hoos, Sidney, "The Canned Fruit and Vegetable Industries—Some Economic Aspects and Trends," in Hearings (Nov. 9, 1959), Subcom. No. 5, Select Committee on Small Business, 86th Congress, 1st Sess., Committee Print, U.S. Gov't. Print. Off. (1960), Part II, Vol. 1, pp. 677-704.

Jackson, Hilliard, *The Process of Pricing Live Broilers in Northwest Arkansas,* Ark. Agr. Expt. Sta. Bul. 618, Jan. 1960.

Jones, Harold B., *Expansion of Contract Egg Operations in Georgia,* Ga. Agr. Expt. Sta. Mimeo. Ser. N.S. 87, Jan. 1960.

Johnson, Stewart, "Number of Various Types of Milk Distributors in Connecticut, 1940-60," *Dairy Marketing,* Ext. Rept., Univ. of Conn., June 1960.

Klein, Jack E., *Marketing Milk in Alaska,* USDA Mktg. Res. Rept. No. 385, March 1960.

Kline, R. G., and M. E. Cravens, *Grower-Processor Agreements in the Sweet Corn for Processing Industry,* Ohio Agr. Expt. Sta., North Central Reg. Pub. No. 85, June 1958.

Knapp, Joseph G., "Cooperative Expansion Through Horizontal Integration," *J. Farm Econ.,* 32:1031-47, Nov. 1950, Part 2.

Kohls, R. L., *By-Passing of Terminal Market Facilities in Agricultural Marketing,* Paper given at Dec. 1956 meeting of the Amer. Mktg. Assoc., Purdue Univ.

Kohls, R. L., "Decision Making in Integrated Production and Marketing Systems," *J. Farm Econ.,* 40:1801-11, Dec. 1958.

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Koller, E. Fred, "Vertical Integration of Agricultural Cooperatives," *J. Farm Econ.,* 32:1048-58, Nov. 1950, Part 2.

Lanzillotti, Robert F., "The Superior Market Power of Food Processors and Agricultural Supply Firms—Its Relation to the Farm Problem," *J. Farm Econ.,* 42:1228-47, Dec. 1960.

Manchester, Alden C., "The Changing Role of Fruit Auctions," USDA, Mktg. Res. Rept. No. 331, June 1959.

Markham, Jesse W., *The Fertilizer Industry: Study of an Imperfect Market,* Vanderbilt Univ. Press, 1958.

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## APPENDIX IV. MARKET STRUCTURE ANALYSIS RESEARCH REPORTED BY EXPERIMENT STATIONS AND THE USDA

Compiled from information received in response to a questionnaire mailed to all experiment stations and the USDA during June and July, 1960. Each was asked to report research relating to market structure analysis that had recently been completed, was then underway, or was planned for the following year. Titles of research projects and dates started (where supplied) are listed for each of the institutions reporting.

University of Arizona

Evaluation of the Effect of Commercial Cattle Feeding Operations on Methods of Sale and Prices Received for Slaughter Cattle in Arizona and Southern California, 1957

Competitive Position of the Los Angeles Market, 1954

University of Arkansas
- Marketing Practices of Commercial Egg Handlers, 1960

University of California
- Market Structure and Industry Organization in the Marketing and Processing of Farm Products

Colorado State University
- Effects of Buying Practices of Large Scale Food Retailers, 1959

University of Connecticut
- Factors Affecting the Output, Size, Costs and Location of Poultry Plants in Southern New England

University of Florida
- Changes in the Market Structure for Selected Florida Agricultural Industry, 1960
- Market Structure of the Nursery Industry, 1959
- Marketing of Florida Cigar Wrapper Tobacco, Type 62, 1960

University of Georgia
- Some Economic Aspects of Vertical Integration and Contract Farming in Hog Industry of Georgia, 1958

University of Hawaii
- Effects of Buying Policies of Supermarkets and Military Agencies Upon Producers and Distributors of Agricultural Products in Hawaii, 1959

University of Idaho
- The Economic Effect of Recent Changes in the Marketing Structure and Procurement Methods on Idaho Potato Producers, 1958

University of Illinois
- An Appraisal of Cooperative Livestock Marketing in Illinois

Purdue University
- Causes of Imperfections in Local Indiana Grain Markets, 1954
- Marketing Practices for Indiana Poultry Products from the Processor or Handler to the Retailer, 1959
- The Impact of Marketing Developments on the Operation and Organization of the Feed Industry, 1960
- Effects of Integration in Agriculture on Marketing and Pricing Efficiency, 1960
- The Nature and Effects of Integrated Marketing Arrangements Between Woodland Owners and Timber Processors, 1960
- Effects of Integration on Agricultural Marketing Efficiency, 1958

Iowa State University
- Market Structure and Pricing in the Livestock Industries, 1960
- Structural Changes in the Dairy Industry, 1960

Kansas State University
- Marketing Efficiency for Wheat, 1958

University of Kentucky
- Reducing Market Risks in Selling Selected Farm Products, 1958

University of Maine
- Effect of Transportation, Buying and Selling Practices and Methods on the Market Structure, Price and Distribution of Northeastern Potatoes, 1960

University of Minnesota
- An Economic Appraisal of the Soybean Industry, 1960
- The Changing Market Structure of the Minnesota Dairy Industry, 1960

Internal and External Relationships and Trends in the Agribusiness Sector of the Minnesota Economy, 1959
Vertical Integration in the Minnesota Turkey Industry, 1959
Minnesota Livestock Market Structures as a Complementary Part of a Regional Study, NCM-18, 1956
The Extent and Economic Effects of Integration and Related Structural Changes in the Livestock and Poultry Industries in Minnesota, 1958

Mississippi Agricultural Experiment Station
An Evaluation of the Competitive Position of Vegetable Industry of Mississippi and Competing Areas, 1959
Alternative Practices and Systems for Increased Efficiency in Cotton Marketing, 1960

University of Missouri
Market Organization and Structure of the Missouri Dairy Industry, 1960
Identification and Analysis of Problems of Location and of Structural Change in Livestock Markets, 1959

Montana State College
An Economic Analysis of the Impact of Technology and Increased Market Information on the Hay Marketing Structure in Montana, 1960
Economics of Marketing Hay and Feed in Montana, with Reference to Economies of Feed Mixing Firms, 1958
The Survival and Growth Potential of Small Meat Packing Businesses in Montana, 1960
Potentialities of Co-ops in Assisting Montana Farmers to Market Excess Grain through Livestock, 1958.

University of Nebraska
Study of Changes in the Organization and Practices of the Perishable Bakery Products Industry and the Impacts of Such Changes Upon Growers of Farm Products Used by the Bakery Indusry, 1957

University of Nevada
The Economics of Marketing Hay and Feed Grains in Nevada, 1955

University of New Hampshire
Cost Reductions in Milk Processing by Consolidation, 1958
Individual Firm Efficiency and Industry Adjustments to Improve Marketing of Poultry Products, 1957

Rutgers University
Alternative Systems for Servicing Northeastern Egg Markets, 1960
An Analysis of Existing Integrating Agreements and the Functions Performed by Integrating Agencies, with Regards to Their Effect Upon the Production and Marketing of Food, the Income of Farmers, and the Economy of the Agricultural Industry in New Jersey

North Carolina State College
An Evaluation of the Market Structure in Selected Vegetable Producing Areas of the South, 1952

North Dakota Agricultural College
Changing Market Structure and Organization of Mid-west Dairy Industry, 1960
An Analysis of Income Alternatives and Changing Patterns of Livestock Marketing in North Dakota, 1955

Ohio Agricultural Experiment Station
Effect of Transportation and Service Developments on the Grain, Feed and Farm Supply Agencies in Ohio, 1959

Trade Practices with Special References to the Dairy Industry, 1957
Factors Influencing Livestock Market Locations, 1958

Oklahoma State University
Organizational Structure of the Marketing System for Livestock and Meat in the Southern Plains, 1960

Oregon State College
Impact of Changing Market Organization and Structure on the Canned Fruit and Vegetable Industry, 1959
Farm Supply Cooperatives in a Changing Market, 1958

Pennsylvania State University
Effects of Technology and Market Structure in Physical and Economic Organization of Market Milk Industry in Pennsylvania
Effect of Technology on the Physical and Financial Organization of Individual Firms in the Market Milk Industry
Changing Market Structure in the Market Milk Industry
The Impact of Subdealers on the Market Milk Industry

University of Puerto Rico
The Effect of Market Organization and Structure and Scale of Operation on Broiler Marketing Costs and Efficiency in Puerto Rico, 1959

University of Rhode Island
Changing Market Methods and Their Effect on the Competitive Position of Egg Producers Close to a Metropolitan Area, 1960

Clemson Agricultural College
Economic Evaluation of Movement of Fluid Milk from Sources of Production to Market Areas in South Carolina, 1960

South Dakota State College
A Study of Managerial Decision Making and Procurement Policies in Selected South Dakota Dairy Plants, 1957

University of Tennessee
Wholesale Market Structure and Channels for Fresh Fruits and Vegetables in Tennessee, 1960
Vertical Integration in the Marketing of Livestock in Tennessee, 1960

A. and M. College of Texas
An Economic Analysis of Alternative Marketing Methods for Cattle and Sheep in Texas, 1959

Utah State University
Adjustments Needed by Poultry Farmer Cooperatives in Utah to Compete in a Changing Economy, 1960

Vermont Agricultural Experiment Station
Adapting Milk Pasteurizing Plants to Changing Conditions, 1959

Washington State University
The Marketing Structure and Marketing Practices Associated With the Initial Processors of Timber Obtained From Small Woodlands, 1959
Adjustments of Farmer Cooperatives to Marketing Changes, 1959
Impact of Procurement Policies and Practices of Large Scale Food Retailers Upon Fruit and Vegetable Producers, 1959

West Virginia University
The Influence of Demand Elasticity of Selected Agricultural Commodities on Market Organization and Structure, 1959
The Nature of Competition Among Apple Processors in the Appalachian Area, 1953

University of Wisconsin
- Factors Influencing Entrepreneurial Decisions in the Agricultural Processing Industries, 1953
- Market Structure and Competitive Behavior in the Dairy Industry—The Present State of Knowledge, 1957
- The Changing Structure and Performance of the Wisconsin Ice Cream Industry, 1959
- Changes in Market Structure and Large Scale Organization in Fruit and Vegetable Processing, 1960
- Changing Market Structure of Grocery Retailing, 1940-58, 1958

University of Wyoming
- The Impact of Meat Buying Specifications of Large Retail Stores Upon Range Producers of Sheep and Cattle, 1959

U. S. Department of Agriculture
- Structure, Policies, and Practices of the Market for Pennsylvania Filler Tobacco Type 41, and Shade Grown Wrappers, Types 61 and 62, 1958
- The Impact of Changing Market Organization and Structure on the Production, Processing and Distribution of Market Milk, 1958
- Improving the Pricing and Operational Efficiency of Wholesale Meat Distribution, 1957
- Economic Analysis of the Changing Locations of Livestock Slaughter and Meat Processing, 1955
- Changes in Structure of Wholesale Fruit and Vegetable Markets, 1956
- Consolidation, Integration and Merger Among Agricultural Marketing Firms and Their Economic Consequences, 1956

Regional Projects
- *North Central–Dairy*–Changing Market Structure and Organization of the Midwest Dairy Industry, 1960
- *North Central–Livestock*–Adjustments in Livestock Marketing in the North Central States to Changing Patterns of Production and Consumption, 1960
- *Western–Dairy*–The Impact of Changing Market Organization and Structure on the Production, Processing, Distribution, and Pricing of Market Milk
- *Western–Livestock*–An Economic Analysis of Alternative Marketing Methods of Cattle and Sheep in the West
- *Western–Marketing*–Adjustments of Farmer Cooperatives to Marketing Changes, 1959
- *Western–Marketing*–Procurement Policies and Practices of Large Scale Food Retailers, 1959

# A POLICY TO REDISTRIBUTE LOSSES FROM ECONOMIC PROGRESS

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THE ROUTE assigned to me is not on the high road of traditional analysis paved with roles and factors having impacts and effects which produce trends and which lend themselves to cold, positive analysis with explanations and projections. I am to take the low road of policy full of opinions, beliefs and values and hot with controversy. Here one proceeds at his own peril. The conventional way to reduce the risk is to camouflage one's values and to wrap the mantle of academic innocence about himself. I have decided to walk it unprotected although I do so with trepidation.

The concept of labor mobility is too rich for my appetite. I want a simpler concept, one that abstracts from sociological and cultural factors, relevant as they are to some of the issues before us, because I want to restrict my treatment to the actions of people where they change jobs to improve their economic positions based on economic motivations. Why, then, do people change jobs in this restricted context? They do so because earnings to be had from the old jobs have fallen, or those from new jobs have risen, or the people involved have improved or have lost ground in skills and knowledge to do useful work.[1] It will be convenient to think of these changes as *transfers* of human resources which entail costs and returns. By jobs I do not mean only work that is done for someone else for a wage or for a salary. People can be self-employed or they can be entrepreneurs. Thus, I wish to include all human effort entering into economic endeavor. Although the concept of changing jobs does not necessarily require a change in occupation or in location, the core of this problem confronting farm people does entail a change in occupation and as a rule also in location.

The economic test is based on resource allocation theory; the particular allocation before us is that of labor and its employment. The cir-

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[1] Various combinations are of course possible. Nor do I exclude young people entering the labor force. They should be treated as changing from the "job" of studying (students) to a traditional job. Old people "retiring", also, are to be included. I do, however, wish to abstract from changes in job preferences.

cumstances are those of an expanding economy in which both jobs and human resources are being altered fairly rapidly over time. Under these circumstances, it is hard to conceive of changes in jobs, representing the demand for workers with particular skills and knowledge, and the changes in human resources, making up the supply of workers with their skills and knowledge, paralleling each other so closely that no person would have to move or enter upon a new occupation in matching jobs and workers. An expanding economy gives rise to a different conception. The circumstances that characterize our economic growth require a conception of an economy in which there is a vast amount of internal migration and many transfers among occupations over time. Thus, in examining the equilibriating process connecting jobs and human resources by occupations, industries and areas we are guided by the hypothesis that adjustments between jobs and human resources are the order of the day.

We observe a moving disequilibrium between jobs and workers and we seek the causes and the effects upon agriculture. There are numerous sociological and economic factors underlying this disequilibrium and the behavior of people as they adjust. People differ in job preferences; they make decisions based on imperfect information; jobs are plentiful and then scarce as we go from booms to recessions; the relevant future is beset by uncertainty. We observe that there are lags in the way new expectations about jobs reveal themselves in the behavior of people. There are often substantial costs in changing jobs. The skills and knowledge required to farm are a form of human capital which is subject to quasi rent which rises and falls as the fortunes of agriculture fluctuate. In the process not a few farm people are trapped by the low salvage value of their particular skills in other occupations. Analysis at this level can contribute much while abstracting from policy. My assignment, however, is to take the risky step of treating policy as a variable.

I shall, first, review our traditional policy and I shall, then, propose an alternative policy which is, so it seems to me, more appropriate for a rich country such as ours and for our kind of economic progress.

## I

Let me begin with a sketch of the principal attributes of our traditional policy. The heart of it is in the distribution of the windfall gains and "unforeseen"[2] losses from economic progress. The rules of the economic game are that these particular gains and losses are to be absorbed by labor (including management) and by those who own the nonhuman

[2] Not all of these losses are necessarily wholly unforeseen, as I shall argue later in this paper.

resources as changes in demands and supplies reveal themselves in their respective markets. The rationale of this policy rests on the belief that economic progress entails all manner of demand and supply changes. The discovery and accumulation of additional resources alter in many ways the quantity and quality of resources whether we treat them as inputs or as stocks of capital rendering productive services. Thus, there is the belief that the relevant changes are not only numerous but that they also take many turns and twists that cannot be anticipated and, thus, planning and policy to cope with them is not possible. There is the further belief that these changes as a rule occur slowly and gradually, that they are widely diffused and that the resulting windfall gains and losses are not accumulative in the way they come to rest on the particular workers and resource owners. Lastly, and of great importance, there is the strongly held belief that these particular gains and losses are the essential inducements to get labor and owners of resources to make the necessary adjustments called for by economic progress. Thus, it should surprise no one that it has long been held that it is the better part of wisdom to let the chips fall where they may. In line with that wisdom, we have evolved our traditional policy which *lets* and which *requires* labor and those who own the nonhuman resources to absorb the windfall gains and the "unforeseen" losses that occur as a consequence of economic progress.

This policy has not escaped criticism and there have been many protest movements. The classical treatment of rent and its implications that landlords acquire an unearned income is a major part of this criticism. Free trade, the nationalization of land, and the single tax have been put forward to reduce or to give to the State this unearned income from increases in rent. The sorry history of the poor laws following the social and economic disorganization attendant upon the industrial revolution and the movements in protest belong here. So does the public outcry against the enclosures. Again and again workers have tried to protect their jobs from the adverse consequences of the introduction of new machines. There then came the mounting protest to the fluctuations in employment caused by the uneven process of economic growth with its booms and recessions; and, as a result, governments now employ fiscal and monetary measures to reduce these fluctuations and provide unemployment payments. Farmers and peasants in western countries have also protested, predominately against two features; namely, against the wide fluctuations in farm prices and against secular declines in the prices of the products they produce and sell. Farmers, however, have not distinguished between losses in earnings from their own effort (their labor and management) and changes in the return to land and to other

forms of capital they employ in farming caused by economic progress.

Yet, the traditional policy has prevailed. It has done so in spite of much criticism and many protests and even when one takes into account the public measures that have been taken to modify and to supplement this policy. The core of this policy remains intact in the sense that we let, or require, labor and the owners of resources to absorb the windfalls and losses from economic progress. The values and beliefs underlying this policy are best revealed in the ever present and formidable question: How else can one maintain the essence of an open, market economy?

## II

Let me now present an alternative policy and the reasons in support of it. Ideally, the objective of this policy is to ensure individuals they will not suffer losses caused by economic progress. How to identify these losses and how to protect individuals against them are no doubt important, practical matters. Before turning to them, however, I want to consider what such a policy will do to incentives in general. It would redistribute the losses but it would not alter directly the windfall gains from economic progress that labor and owners of nonhuman resources now absorb. These gains, accordingly, are not to be captured (indirectly they will be modified). This policy, therefore, lacks symmetry. But it is of critical importance not to take away these gains because they become the (remaining) incentives to induce labor and resource owners to make the required adjustments. It is assumed, here, that these losses are much smaller than the gains and, therefore, that the net aggregate gains from economic progress are not only large but large enough to provide an effective system of incentives. The asymmetry, therefore, is an essential part of this policy because it makes possible maintaining the substance of an open economy.

Before considering the ways and means of making this policy effective, there is the question: How well grounded are the beliefs about economic progress on which our traditional policy rests? Are the gains and losses from economic progress widely distributed? Among consumers, yes. But not so among producers. What this means is that consumers gain qua consumers although some of them lose in their capacity as producers. For example, a decline in real costs in producing farm products as a consequence of economic progress soon benefits all consumers, including farm people purely in their capacity as consumers, but some farm people can lose more as producers than they gain as consumers from this process.

Producer gains and losses from economic progress are by no means

evenly distributed. Consider only the losses as these are revealed to us in what we call the "depressed areas." Areas that are dependent upon coal mining were long depressed. New England textiles was another such. Other industrial activities also leave entire communities seriously depressed as a consequence of supply and demand changes arising from economic progress. Much of our agriculture, because of the rapid rate of improvements in the production possibilities in farming, because of the slow rate at which the demand schedule for farm products shifts to the right, and because of difficulties in adjusting to these changes, becomes depressed. Surely no one can any longer maintain that these producer losses from economic progress are distributed at all evenly among *occupations, industries* and *areas.*

Moreover, many of these producer losses from economic progress are accumulative, that is, they continue to mount and to burden particular occupations, industries and areas, over long periods of time. Northern textiles, coal mining and agriculture have been up against such losses from economic progress for many decades. Surely the end is not in sight for agriculture.

There is, also, the belief that none of these producer losses can be dealt with by policy and by appropriate public measures because none of them can be foreseen. They are thought to be in the realm of the unknown, i.e., losses that occur as a result of pure uncertainty. Here, again, the evidence does not support such an extreme position. Particular classes of people as workers and even some owners of nonhuman resources are absorbing such losses not because *no one knew* that these losses would occur but because some people are caught in a process from which they find it exceedingly hard to extricate themselves. Older farm people are thus caught. The "salvage" value of their skills if they were to leave agriculture is even less than the reduced earnings they can win for themselves in farming. The quasi rent on what they have invested in skills and knowledge to farm falls because even though younger people leave agriculture there is a long lag. There is always a transfer price which has the characteristics of a human investment. Why do younger people leave agriculture more readily than do older people? The reason for this selective migration by age may simply arise out of the fact that the costs of migrating and of acquiring new skills represent a substantial investment and for older people there are not enough years remaining to warrant making such an investment in themselves. Thus, they stay and absorb the loss although they can see it coming.

We know full well that much of agriculture is in for losses that are a consequence of economic progress for years to come. The rub here is

not that there is no relevant knowledge but that some farm people cannot act on it in ways to escape serious losses for themselves.

What about the belief that any attempt to redistribute these producer losses from economic progress will inevitably undermine and ultimately destroy our open, market economy? The essence of our incentive system can be preserved by giving free rein to the windfall gains from economic progress. True, this means that these gains will have to carry a larger load, in fact the entire burden of inducing people to make the necessary adjustments called for by economic progress. But this is not the whole of the story, for the present distribution of these losses in many situations gives rise to a kind of reverse English, because they undermine the capital and credit position of workers and of the owners of the nonhuman resources who absorb these losses and because no small amount of capital is frequently required to extricate oneself once one is caught in such a situation.

In the case of agriculture, weight must also be given to the fact that some of these producer losses from economic progress falling on farm people are a consequence of public policy to support agricultural research and disseminate the new knowledge from such research so that it will be adopted rapidly and effectively. The new and better production possibilities that have characterized our agriculture and that are continuing to take place in farming are in no small part a consequence of such public programs.

## III

Returning, then, to the proposed policy, as already set forth, its purpose is to ensure in principle that laborers and owners of resources would not be made worse off as a consequence of economic progress. But can this be done? Is such a policy feasible? What is the logical basis for determining the lines of action to be taken? Let me narrow the question for a moment by focusing on that part of economic progress which we achieve through agricultural research.

Assume the following: That the annual *rate* of return to resources at the margin employed in agricultural research is 50 percent (thus, a marginal rate that is far higher than the existing rates of return to alternative investments at their margins); and that as a consequence of the new, useful knowledge from this agricultural research three things happen: (1) the real relative price of farm products falls to the *advantage of consumers;* (2) the real value of the wealth represented by land used in farming falls to the *disadvantage of landowners;* and (3) that less farm labor is required in farming, making migration from farms necessary

and, as a result of the lag that occurs in this adjustment, the earnings for human effort in farming fall relative to what they otherwise would have been, to the *disadvantage of the farm labor force,* especially so for those who are self employed.

Should a community under these circumstances allocate more of its resources to agricultural research in order to take advantage of the relatively high marginal return available to it from this source? The answer is yes, but only if there is some way of reckoning and reconciling all of the gains and the losses. The problem here is on the same footing as are the gains and losses from the removal of an import tariff and the treatment rests on the principle of compensation. The gross gains, in our case, to consumers are larger than the losses of landowners and of farm people as workers so that there is a net gain to be had after compensation, and accordingly, the community could be made better off.[3]

There is, then, a logical basis for implementing the proposed policy. There are, nevertheless, some practical difficulties. What is the basis for distinguishing between losses from economic progress and all of the other losses that occur? What are the forms of compensation that are efficient in achieving the objective of this policy? Is it feasible for a government to administer such compensation? These are difficult questions but they are no more formidable than those that arose in our efforts to cope with mass unemployment.

The losses from mass unemployment is the analogue of the losses from economic progress, and I find that it is an instructive analogue in taking ones bearing on our problem. We do well to remember that there were many serious objections to any policy whatsoever to deal with mass unemployment. Many people, lay and professional, firmly believed that any public measures to treat this unemployment would seriously impair the economy; now, too, there are many who look in the same way upon measures to deal with the losses from economic progress, as is clear from some of the objections to the "depressed areas" legislation. There are some who thought, in the case of mass unemployment, that public measures were unnecessary because if only wages were more flexible there would be no such unemployment. Similarly, there are those who believe that the resource mal-allocations caused by economic progress would rapidly correct themselves if only market prices were free and flexible.

Yet out of our trials and errors and from what we have learned about booms and recessions, there is now a strong consensus that economic stability is an important objective to be achieved through public measures. There are, as we all know, still substantial disagreements about

[3] Assume here that the costs of administering such compensation is zero.

the appropriate fiscal, monetary and other measures for achieving this objective of economic stability. There also are unemployment payments and these, too, are still far from satisfactory. The point is that the discussion and study of mass unemployment is no longer, "Should there be a policy to cope with it?" That question has been settled in favor of having such a policy. The question now is, "How can it be done more efficiently than is the case presently?" But we are not at this stage in dealing with the losses from economic progress. Neither our analytical work nor the public policy debate is addressed to the question of ways and means. The issue that is still before us is comparable to the first, namely, "Should there be a policy to cope with the losses from economic progress?" The burden of this paper has been to show that such a policy is warranted because of our kind of economic growth, because of the uneven way the losses from economic progress are distributed and the welfare implications of this unequal distribution of such losses and because there is a logical basis for redistributing these losses through public measures.

## IV

In implementing this policy, there are good reasons for beginning with the losses borne by labor including the self-employed and management, and for leaving aside until later how best to treat the losses that owners of resources bear as a consequence of economic progress. In the first place, we have a strong precedent for doing so in the early approach to mass unemployment: when unemployment insurance was undertaken, no "insurance" was provided for unemployed plants and equipment, although at a later stage tax laws were altered so firms could spread their losses. Secondly, the adjustments confronting labor are as a rule subject to longer lags than are those for nonhuman resources. Human beings have a much longer productive life than do most forms of reproducible physical capital. Thus by doing no more than not replacing the machines and tractors that wear out, the stock is rapidly reduced over time, whereas people retire from the work they are doing only after four decades or more of work. A third reason is in the fact that workers, because of compelling cultural reasons, are unique in producing not only their own replacement but for good measure add to their numbers. Imagine how different the farm problem would be presently if no farm children had been born these last several decades! Also, in the case of agriculture, the human investment in skills and knowledge required to farm is very substantial and the demand for these particular skills and knowledge elsewhere in the economy is indeed small. Lastly, there is the obvious fact that most members of the labor force

are tied to families and in addition are rooted in communities which they are reluctant to leave. We do well for these several reasons to concentrate on labor in treating the losses from economic progress.

In bringing this paper to a close, I can do no more than mention the types of public measures that are likely to prove useful in achieving the objectives of this particular policy. Two broad lines of action are open to us: (1) measures to accelerate the adjustment process; and (2) measures to compensate those who nevertheless bear losses. (Note the parallelism, once again, to what has been done in dealing with mass unemployment: there have been various measures to reduce the fluctuations in business activities with a view of attaining economic stability and thus to achieve more nearly continuous full employment; there also have been payments to cushion the losses in earnings from unemployment.)

To accelerate the adjustment process does not mean that the goal is to eliminate the lag in this adjustment altogether, any more than the goal of economic stability is to eliminate all fluctuations in business. Even though it were possible to devise programs that would eliminate this lag, it would undoubtedly be all too costly to do so. What is implied, however, is that the lag presently is all too long in the sense that much could be gained from a reckoning of costs and returns by reducing it substantially.

1. *Rate of unemployment*

The rise and fall in unemployment of the range that we have been experiencing since the war, and the fluctuations in business activities with which this unemployment is associated, appear not to have had any large influence upon the domestic demand for U.S. farm products. Nevertheless, the longer run welfare position of people in farming has been seriously affected by periods of large unemployment which have reduced sharply the nonfarm jobs available to off-farm migrants. The post-war behavior of the economy clearly indicates that the *rate* of off-farm migration is highly sensitive to changes in unemployment that have characterized these post-war booms and recessions in business. Sjaastad's study leaves little room for doubt on this basic point. Let me put this relationship as follows: When 5, 6 or 7 percent of the labor force is unemployed, the adjustment process under consideration is brought to a halt; on the other hand, when unemployment declines to 3 or 4 percent, off-farm migration becomes large. During recent trough periods we have had: (1) late 1949, somewhat more than 6 percent unemployed, (2) summer of 1954, slightly less than 6 percent unemployed, and (3) spring of 1958, more than 7 percent. The rate of off-farm migration during each of these troughs fell sharply (it may even have re-

versed itself during the last of these troughs). Conversely, during the preceding peak periods, unemployment fell to 4 percent in late 1948, to 3 percent during the middle of 1953 and to 4 percent toward the middle of 1957. During each of these peak periods, the off-farm migration rose rapidly and became impressively large. But during the expansion phase since the middle of 1958, unemployment has stayed high; we have not gotten down to the former low rates of 3 or 4 percent unemployed, and, as a consequence, we have gone through a boom phase of a business cycle with altogether too much unemployment to provide jobs for farm people who wanted to leave agriculture. It is the first time since the war that we have gone through a boom phase with so much unemployment that the adjustment process, on which agriculture is so fundamentally dependent, has failed to function satisfactorily.

Agricultural leaders have been altogether shortsighted in concentrating so much of their attention on the current level of farm prices and overlooking the serious adverse implications to their welfare of the high rate of unemployment and the mistakes in monetary and fiscal decisions that lie back of this excessive unemployment. We can and should do much better in reducing the rate of unemployment than we have in recent years. Moreover, to do so is of great importance in accelerating the adjustment process under consideration.

2. *The investment component in skills and knowledge*

These human investments play a large and complex role in our adjustment process. Some skills and knowledge are specific to farming and some are not specialized. Young people have many years during which they can realize on new investments in themselves whereas old people do not have this opportunity. In general, farm people who are both young and well educated, e.g., have completed high school without specializing in agriculture, have both a relatively large investment that they can transfer to advantage and have time enough to warrant making additional investments in themselves to acquire the required nonfarm skills and knowledge. But those farm people who are not young and who possess mainly the skills and knowledge that are specific to farming have little to transfer, and they have too few years remaining to warrant new investments of this type in themselves. These farm people are trapped in agriculture. Their one ray of hope is that enough of those farm people who are not caught, as they are, will migrate to accelerate the adjustment and thus minimize the losses they will have to bear as a consequence of economic progress.

Our objective here is to acclerate off-farm migration. Most off-farm migrants are restricted largely to the lower paid, unskilled occupations.

To enter upon better jobs and to climb the occupational ladder more rapidly, these off-farm migrants must acquire particular skills. To do this requires substantial resources. A strong case can be made for the position that the costs of such new investments can and should be borne on public account, because it would induce more farm people to leave agriculture and thus accelerate the adjustment process, and because the social gains often exceed the private gains when all costs and returns are taken into account—including the important fact that the children of the families that transfer are going to be better located with reference to job opportunities when they, in turn, enter the labor force. It should not be very difficult to develop programs to do this.

3. *Homesteads in Reverse*

This proposal which I made some years ago continues, so it seems to me, to have merit in coping with an important aspect of the problem under consideration. The recent work of Glenn Johnson concentrating on the divergency between the buying and the selling prices of some classes of inputs used in farming to explain both the "excess capacity" and the large number of obsolete (inefficient) farms in parts of agriculture, lends strong support for this line of action to accelerate the necessary adjustments. In a well conceived program of this kind account should be taken of both human and nonhuman assets used in farming, and to this extent section 2, above, may be treated as an integral part of homesteads in reverse.

The advantages here are of two types: (1) one can treat the problem confronting older farm people arising out of the characteristics of their skills and knowledge, already discussed, and (2) one can treat the difficulties that farm people face in disposing of the physical farm assets they have acquired, in order to assist them and thus induce them to leave farming. Various types of programs can no doubt be developed in this framework. The Conservation Reserve Program under The Soil Bank Act is one such. By renting whole farms for a period of years, especially in areas that are probably close to being marginal for growing crops including hay and pasture under existing circumstances, it is possible to assist some farm families to transfer out of farming. Grants to assist farm families to acquire nonfarm homes, to cover the costs of moving to the new place of residence, and to undertake the study and on-the-job training to acquire new skills and knowledge, represents still another relevant approach. Then, too, special programs to purchase particular farm assets at a price that would enhance substantially their salvage value for those farm families that want to leave farming, have a role to play in accelerating off-farm migration.

The specific lines of actions that I have considered under sections 1, 2 and 3 above are each designed to reduce the supply of workers in agriculture and thus to keep the earnings for human effort in farming from falling as low as they otherwise would drop. These measures are comparable to the function of fiscal and monetary measures in dealing with the problem of mass unemployment, inasmuch as they reduce the need for unemployment insurance to compensate workers at least in part for losses in earnings from unemployment. But it is altogether likely that even with good programs of the type outlined above, there will be losses from economic progress borne by human effort in farming for years to come.

Lastly, then, in order to compensate farm people in their capacity as workers and not in their capacity as owners of the productive physical assets used in farming, a program is warranted that will channel some income payments to farm people based wholly on the amount of farm work they do. It would be desirable to make these income payments dependent upon the rate of unemployment. A simple rule would be to make no payments whatsoever whenever unemployment is 4 percent or less and to undertake such payments whenever unemployment exceeds 4 percent. Even a flat rate per hour of farm work done, with all of its shortcomings, might be workable as a beginning.

# PUBLIC PURPOSE IN AGRICULTURAL RESEARCH AND EDUCATION*

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AMERICAN society has been an active participant in economic development of agriculture. Aside from the ownership of productive units in farming, no other nation has had a more direct and effective participation of the public sector in technical development and progress of agriculture. Development of agriculture has not been left to the free market. Society has invested heavily, and reaped high returns, from its direct intervention in promoting progress in the industry. It has had purposeful and well administered public facilities for doing so. These facilities are represented by the agricultural colleges of the Land Grant Universities, and the corresponding activities of the U.S. Department of Agriculture. Like post offices, they are socialized services and facilities.

In contrast to the post office system, however, where firms and consumers pay some price for the services used, the supply of services from the agricultural colleges is largely unrelated to the pricing and market system. The services to be produced, the funds to be used and the distribution of the product are determined by administrators who are public employees and by legislators who are public representatives. The creation and distribution of the services of the agricultural colleges respond only remotely to the pricing mechanism, and no more so than do the public sector products represented by other governmental services. It is therefore appropriate that the products of the agricultural colleges be analyzed and given direction in terms of the national purposes which are paramount in our society and for agriculture. Certainly the agricultural colleges have been and are an extremely important element of public policy relative to the industry.

## *Public Intervention in Agricultural Development*

Since its infancy as an independent nation, the American public has not stood back, in laissez-faire stance, allowing agriculture to develop through play of free markets alone. First it acquired, mainly through public purchase and action, the land resources necessary for agriculture. Then, rather than using private firms for distribution, it developed public mechanisms and allocated land to farmers at very specific prices; prices

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for resources which were as purposeful as specific product price supports of recent decades. Along with this direct policy to get lands settled and developed, it promoted other services directly related to development and economic progress in agriculture. One such definite policy to catalyze agricultural development was land grants to railroads in order to extend transportation facilities and encourage improvement of factor and product markets.

Until spatial restraint fell upon the nation, the main public policy for agricultural development rested on acquisition of land and the distribution to farmers. After the public domain became fully settled, society turned in other directions in continuing its direct and non-market participation in development of agriculture. The United States turned to publicly-operated research and education, lessening the real price of these resources and improving their quality. This was the second major stage in furthering agricultural development. Creation of the agricultural colleges and the U.S.D.A. spurred resource productivity in the agricultural sector. Auxiliary public actions, further lessening the real cost of resources and catalyzing development, included investments in irrigation and reclamation and credit facilities to lessen the costs of capital. In the latter sense, public investment in SCS technical assistance and ACP monetary payments lowers the real costs of resources and practices which give rise to greater yields. These social or non-market activities have been extremely influential in developing agriculture, in extending the productivity of agricultural resources and in augmenting the agricultural supply function. Augmentation of the supply function simultaneously has diminished the relative resource demand function, notably for labor. Farm labor requirements have been cut in half since the 1920's. But even in earlier years, public agricultural development diminished the relative demand for resources. Technical improvement caused input/output coefficients to decline and demand for resources shrunk below the level otherwise needed.

Parallel participation of the public would have had these similarities for other industries: First, basic physical or space resources would be acquired. Plants to produce steel, television and automobiles would be built for example. Next, the public would invest in regional research facilities, develop improved products and lessen the resource requirements for these products. It would then carry research results to all existing firms or those interested in entering the industry. Finally, it would provide public credit facilities for firms wishing to produce steel and autos and maintain a free market for entry of all firms wishing to produce and merchandise these products. It is doubtful, however, if the public would be received in open-arm welcome should it decide to participate in economic development of such industries, in the manner now

traditional for agriculture. Complaints of government intervention, socialism and circumvention of the American way of industry would arise; notwithstanding the fact that agriculture, a very major single industry, has been brought near a productivity and competitive pinnacle by this same public participation.

The effectiveness of public participation in agricultural development is now legend. Remarkable progress, measured in the absolute increase in the product supply function and the relative decline of the factor demand function, serves as a norm for other nations and a goal which most would like to approach. The extremely effective component of public participation in agricultural progress over the last half century has been investment in research and education for technical improvement. The agricultural colleges have been relatively free from political manipulation and have been efficiently administered. Using economic development and technical advance as the criteria, they have been exceptionally successful and society has had immense benefit.

But with the nation's attainment of great wealth and a high absolute level of economic progress (with associated changes in per capita incomes, occupational distribution of the population and preference patterns of consumers), it is appropriate that the framework within which American society invests in technical advance and economic progress of agriculture be examined in terms of the consistency of its several elements. This procedure would be unnecessary if the relative demand for various commodities and services of the economy remained constant over time. But given the degree of affluence attained by American society and the current and prospective shift in the "urgency" which consumers attach to different goods and services as they become wealthier, it is appropriate that publicly produced research and education be reviewed in a developmental complex consistent with the nation's current attainment. As will be shown later, this appraisal calls not for less public investment in these activities; investments which have made great direct contribution to agricultural improvement, and even greater indirect contribution to national purposes and the non-farm society. It could call for more public investment, considering (a) the growth of American society, (b) its more complex and urgent role in world affairs and (c) the potential role which Land Grant Universities might play in this complex.

Another reason also exists, causing this reexamination to be possible and relevant. The private sector of the economy now is extremely important and efficient in development and production of new agricultural technology. Likewise, it is efficient in communicating this knowledge to farmers; appropriately so, because farmer knowledge is necessary for productive use of material resources sold by private firms. In-

vestment by private firms in communication (including salesmen, advertising and public relations) far exceeds that of extension agents and printed materials by the colleges. If measurement extends far enough into fundamental research, the private sector investment in research for new farm technology now exceeds the public investment. For this reason, underdeveloped countries cannot merely reproduce the U.S. public facilities for research and education, represented in the agricultural colleges and the U.S.D.A., and expect development results comparable to those in this country over recent decades. Basic innovations in machinery, ration supplements, fertilizers, improved seeds and even certain aspects of livestock breeding (e.g., chickens), have come to flow largely from the private sector. The private sector also has illustrated greatest ability in applied research, especially in adapting fundamental findings to applicable forms for marketing as materials. Because of growing private sector contributions, public institutions for agriculture have opportunity to evaluate the relative economic urgency of their contributions under economic growth and to divert effort towards those products or services of knowledge (a) apparently still subject to decreasing costs not realized in the private sector, (b) most consistent with the income and growth status of the U.S. economy, (c) not adapted for "package and sale" by private firms but of extreme importance for further progress in agriculture, and (d) consistent with the actual economic impact of research and education on the various segments of society.

### *Goals of Public Research and Education*

It is highly appropriate that the Land Grant College make a systematic analysis of the effects of conventional research and educational programs on income and welfare in both the farm and non-farm sectors of society; then, after this picture is more precisely established, outline the appropriate role of future research and education in a wealthy and progressing economy. Unfortunately, this role is quite different from that of a century ago and from what many Land Grant College staff members still believe it to be. A vigorous and well supported research and educational program will always be needed and the returns over the next several decades can be relatively as high as those over the previous century. But the support for this continued investment is most likely to be forthcoming if Land Grant College personnel better understand the actual effects of their efforts and develop programs which are more complete and systematic in terms of these effects. They will be better able to appeal for support to those segments of society who actually are the chief beneficiaries of the research; in contrast to the existing situation wherein benefit accrues largely to consumers but appeal for financial support is made mainly to farmers.

*Some alternatives*

Numerous goals for research and education can be outlined. Some were appropriate in the first half of the last century, but are now less so. Some appropriately received less focus a half century back but now are crucial and consistent with the state of economic development in the U.S. Some of the goals which can be listed and which have been or are relevant are these:

1. *Increase farm income.* This is an apparently simple goal and the one held by the majority of agricultural college personnel over the past. It was the relevant goal a century past when society was largely agricultural, per capita incomes were low, population was increasing rapidly and demand elasticities were at levels allowing increased output to fetch larger total farm revenue. But this realm clearly ended some decades back. The farm industry in aggregate is no longer the recipient of the gains from continuous and rapid technological improvement. Demand elasticities have declined greatly with a century of national economic progress. Well-fed consumers are not attracted by a greater physical quantity of food. Thus the income elasticity of demand for food in physical magnitude, the percentage increase in per capita food consumption accompanying a one percent increase in income, has dropped effectively to zero. Food demand in total poundage increases not with further growth in income but only with growth in population. Effectively, farm prices can be maintained only if output or supply of farm products grows at the rate of the population, given the level of foreign demand. Perhaps more important to farmers in the short-run, the price elasticity of demand for major farm products, indicating the percentage by which price declines as output increases, is so extremely low that a larger output returns a smaller aggregate revenue than a smaller output.[1] Hence,

[1] The magnitudes of price and income elasticity of demand for farm products have now been so well quantified that they need no further elaboration here. However, for readers who are unacquainted with these magnitudes, we refer to *Demand for Farm Products,* CAA Report 2, Center for Agricultural and Economic Adjustment, Iowa State University. For some readers who are not acquainted with the technical terms and quantities of economics, we include the following explanatory note: The current status of food demand is such that a one percent increase in farm marketings causes price to decline by more than one percent. Decline in total revenue is thus the result. As a numerical example, suppose that price and quantity were both at 100. Revenue will then be $100 \times 100 = 10{,}000$. Now output increases by 10 percent to 110 and price declines by 20 percent to 80. Total revenue is now $110 \times 80 = 8{,}800$. This condition, of price declining by a greater percentage than output, is firmly that of current American agriculture. Under an elasticity situation where price declines by a smaller percentage than quantity, the realm in which Henry Ford developed his merchandising philosophy and early fortune, an increase in output and decline in price causes total revenue increase. In the above example, suppose that output increased by 20 percent to 120 and price declined by 10 percent to 90. Total revenue then is $120 \times 90 = 10{,}800$, an increase—and unfortunately a situation which is not that of agriculture.

research and education leading to greater output in agriculture currently cannot have increased aggregate farm income as its basic goal. Total income to the industry will, in fact, increase if output is diminished.

With present price elasticities, then, it is consumers who gain as technology and output rates are pushed ahead more rapidly than population growth. Farm producers in aggregate bear the costs of these consumer gains. Consumers' total expenditure for food is lessened, compared to what it would be without increased output, and they have more of their budget to allocate for non-farm goods and services. Public research and education for technological improvement in its present form is food policy element, not farm policy element.

2. *Maintenance of competitive position.* It can be argued that technological advance in each state and region is necessary to meet the competition of other states and regions. (The same argument can be used for one farmer against all others.) With low price elasticities of demand and aggregate output increases accompanied by decreased industry revenue, producers in one state who fail to innovate and increase output can have their revenue decreased further than if they do not innovate, as long as producers in other regions innovate and increase output.[2] This logic would also apply to individual agricultural colleges if they considered themselves to be independent competitors with all others; but not if they considered themselves as part of a unified system where policy might be determined jointly.

3. *Avert starvation.* This reason had important basis a century back when the stock of undeveloped land had become fully settled and the population was increasing by a fourth each decade. Technological improvement became a substitute for land; increasingly so and our land supply, effectively and relatively is now greater than at any time in the last 75 years. The starvation reason has no short-run relevance in light of current surplus stocks. It lacks long-run relevance in the sense that our attained level of affluence and real income will never allow us to have consumption drawn down to the level of subsistence. The American consumer is wealthy enough to, and would, bid large amounts of resources into agriculture for technological adaptation and intensive cultivation. He would reward additional resources handsomely, if this condition ever threatened. Subsistence possibility for domestic population

[2]For example, suppose that price falls 1.5 percent for each one percent increase in output. Producers in each of regions A and B are producing 50 units selling at price of 100. Region B increases output by 20 percent to 60 and total output climbs to 110 (50 + 60). Total revenue declines from 10,000 to 9,350. But revenue of A producers declines from 5,000 to 4,250 while that for B producers increases from 5,000 to 5,100. Had both regions increased output by 10 percent, with price declining by 15 percent, revenue of A would decline only to 4,675.

growth is not the important issue in the next half century. The concern is ability to meet growing food requirements without the necessity of drawing large quantities of resources into agriculture, permitting them instead to be used for producing commodities to which consumers with high incomes attach greater marginal urgency. Research and education for technological improvement is needed, for attainment of this end. This is an honorable argument since consumption and well being of the consumer is the goal while production is only a means. Farmers in aggregate would have, under the magnitudes of price elasticity which prevail for food, greater revenue if population and food demand continuously pressed hard against output and supply.

Research in the 1960's, as defense against subsistence diets, is not for the present generation of well-fed consumers, but for those who will exist in the year 2000. It needs to be justified accordingly.

4. *Promotion of economic growth.* The above leads to a more precise and relevant goal for public improvement of agriculture. Under high per capita incomes and very low demand elasticities, traditional research and education in improved technology contributes to growth in the economy generally, but not to increased aggregate income of agriculture under the widespread short-run condition where resources of low mobility remain in the industry to produce more at a lessened income. While the aggregate short-run effect of technological improvement is not increased revenue of agriculture, it does allow food requirements to be produced with fewer resources. Hence, more resources are available for commodities to which well-fed consumers attach greater marginal value, those with high income elasticities of demand, as their incomes grow further. Clearly, this is the major and outstanding contribution of conventional public research and education for agriculture. It, rather than revenue increase for the agricultural industry, has been the actual mass accomplishment of agricultural colleges over recent decades. It is a truly significant and important accomplishment on behalf of consumers' rather than aggregatively and specifically for agricultural producers, except as recipients of general economic progress. It is one which Russia and less developed countries strive to duplicate. But, unfortunately, the Land Grant Universities have not held this image of their accomplishments and, therefore, have not always had programs which were complete and consistent with this significant and broadly justifiable national goal. The future of the agricultural colleges partly revolves around an understanding of this goal and its importance; with research and education geared in directions which continue or further it but at the same time allow direct economic gain to farm producers for their contribution to it. Crystallization of this image, and appropriate extension and adaptation of research and education, will mean a broader

role and opportunity for the agricultural colleges. Failure to do so may require a retreat in the function and resources open to them, at least relative to growth in the total economy and its attendant research and educational efforts and interests.

5. *Increase knowledge.* A goal, of lesser utilitarian appeal, is research and education to increase knowledge *per se*.[3] Although quantitative data are not available for verification, a likely hypothesis is that as societies grow richer they come more nearly to look upon knowledge as an ultimate end or semi-consumption good and to invest accordingly. But to the extent they do so, emphasis is more likely to be on fundamental research and knowledge, and these particularly as they contribute to general economic advance in the more exotic realms of man's quest to create and satisfy his wants. While society may invest some quantity in public research institutions for this as an end *per se*, it is apparent that most of fundamental research has to serve as a means to ends such as those above which are more ultimate to it.

### *Ordering of Research and Education*

Research and education are not purely stochastic phenomena, with chance occurrence relative to their initiation and outcome. They need not serve as exogenous variables, with their direction predetermined by conventions of the past or as by-products of a previous organizational structure. They can be geared to the present and prospective economic or developmental status of a nation, even to bring distribution of gain from progress to producers as well as consumers.[4] The probability of scientific discovery for a particular product, function, or service depends on the quantity and quality of research resources allocated to it. Quantitative guides, if recognized and used in the administration of research, exist even for gearing physical and biological sciences to the emphases specified by economic growth. We explain these and other criteria below.

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[3] Other goals could be mentioned but these serve largely as means to, or modification of, those mentioned above. Included here might be such goals as research to (1) guarantee continuance of competition (2) attain scale economies in research not attainable by individual firms and (3) encourage a desired distribution of income. These have been detailed elsewhere. (See Heady, Earl O., "Welfare Aspects of Technological Change in Agriculture," *J. Farm Econ.*, 31: 293-316, May 1949.)

[4] Progress is generally desired by consumers and various sectors of producers. The main problem is to obtain distributions of gains and losses which guarantee positive-sum outcome in aggregate utility gain and avoidance of conditions which cause some persons to bear heavy costs while others reap gain. Research can be adapted to this framework, or it can be carried on in conventional manner and combined with other policy to better guarantee positive-sum utility outcomes. We discuss these possibilities in a forthcoming book.

*Ordering biological and physical research for growth*

More than otherwise, emphasis in research and education of agricultural colleges over the past decades has been on innovations which increase physical productivity and output from resources specialized to agriculture. Stress and quantity has been greatest in research which increases yield per acre, output per animal or production per unit of feed. (The traditions and lore of agricultural science evidently have given more recognition to the worker who thus accomplishes, as compared to the one who develops an improved quality or embodies a new service in a product.) This is especially the relevant emphasis when either (a) a nation's diet is near or below the subsistence level or (b) the price elasticity of demand for food is greater than one. Neither of these conditions holds true in the United States. Hence, while the paramount emphasis in India is correctly that of increasing yield per acre of staples such as rice, this is not true in the United States.

One set of criteria for ordering biological or physical research and education in public institutions which are not part of the market in a private enterprise economy, is still reflected through quantities of the market. Income elasticities of demand, quantities which can be measured and have practical empirical meaning, can serve as the criteria. In effect, these quantities indicate that consumers who are well fed and have high incomes (a) take satisfaction of hunger as granted, with worry mainly of obesity, and (b) are more intensely concerned, not with obtaining "commonplace luxuries" such as food, electricity, running water, telephones, radios, cars and a forty-hour week, but with more "exotic necessities" such as hi-fi, automatic transmissions, power boats and automatic washers and dryers. They place no premium on greater physical quantity of food per capita as their income grows. Food poundage intake per person has not increased for forty years, even though per capita real income per person has increased several times. While the consumer places no premium on the quantity aspects of food, income elasticities show that he does, along with the premium placed on other exotic necessities, place positive premium on the quality or service aspects which can be incorporated with foods.

Income elasticities of demand could well be used as the major basis for ordering biological and physical research on farm products aimed at improving consumer and producer welfare in an economy as wealthy as that of the U.S.[5] Directors of research might lay out before them, for

[5] Research for economic development purposes without concern over distribution of the gains and costs of progress would concern itself little with magnitude of demand elasticities. Our emphasis here, for research organizations which suppose themselves to provide gain largely to agricultural producers, is on research which

the purposes focal to this section, the complete array of income elasticities for different agricultural products and for different aspects of products such as quality, quantity, service, convenience, etc. Research resources would then be allocated in terms of and relative to magnitudes of income elasticities of demand. Those products, qualities and services with highest elasticities are those from which consumers will derive greatest satisfaction as their income and total expenditures increase. For this very reason, they are the ones for which consumers will reward farmers most in profit as per capita income continues to grow. Certainly private firms are concentrating research in these very directions (i.e. "growth" industries and products) for the reasons mentioned.

An ordering of research in line with these quantities would not nullify the demand for particular specializations in agricultural science, but would only turn the direction of their concentration. For example, plant genetics would be just as important as before, but emphasis would be more on breeding to develop "inward quality and services," rather than quantity. Genes, heterozygote, recessive, dominance, mathematics, chromozome and other scientific concepts and phenomena which serve as traditions of the field would continue so. They would simply be used in relation to more urgent social purposes. The challenge to plant breeding scientists need not be lessened. To the contrary, it could be increased since the quality-service aspects of plants have been less exploited and likely are more complex. The same would be true for the majority of specialized agricultural sciences. We have, then, one approximate basis for estimating the payoff and needed direction of biological research and education under economic growth, starting with a high level of per capita well being and further growth of income in sight. Undoubtedly it would call for sizable increases in physical and biological research relating to food processing and manufacture in stages beyond the farm.

*Emphasis on social sciences for developmental attainment*

The criteria above serve as one basis for ordering research. Emphasis was on allocation within the physical and biological sciences, with focus on innovating services of greatest marginal urgency to high income consumers and, hence, with greatest prospect for monetary reward to farmers. But if appropriate total goals are selected for research in the Land Grant Universities, growth criteria also relate to the social sciences.

Public research and education in agriculture has not had its most significant effect in increasing aggregate farm profits or in creating new

allows progress but more nearly guarantees positive-sum aggregate utility outcomes in distribution of gains. Too, using elasticities as a criterion, they would need to be weighted by the amounts of resources used by various commodities.

and different food utility and service for consumers, but in helping to lessen the amount of the nation's resources required to produce food. Labor and other resources are freed from agriculture so that they can be used to produce schools, hospitals and roads in the public sector; to produce houses, television, power boats and clothes dryers and the many other goods of "great marginal consumer urgency" in the private sector. This saving in resources, made possible and encouraged through technological discovery and favorable factor prices, allows us to produce food in surplus with less than 10 percent of our labor force. In contrast, Russia requires around 40 percent while selected undeveloped countries use as much as 75 percent. In the past forty years, the farm work force has declined by 48 percent, at the same time that food requirements, on a population basis, increased 89 percent. And we still have excess labor in agriculture. Measured roughly by the ratio of input to output between 1910 and 1960—a somewhat magnified measure of the effect of technical improvements from public institutions—labor inputs in 1960 would have needed to be 270 percent greater than they actually were had the nation been fed equally well and had technology been dormant. Technical progress, for commodities of low demand elasticities, lessens profits and reduces labor requirements, so that people must transfer from agriculture if per farm and per person income of those remaining is to be maintained or increased. It is in this sense that agricultural colleges of this generation represent the arm of food or consumer policy and general economic development rather than of farm policy.

This is the very real contribution of technological progress in agriculture. The agricultural colleges have been in the vanguard and the major contributor to it. They can well pride themselves in this facet of national economic development. It has been a major reason for their existence, although it has not always been so recognized.

The agricultural colleges should become more cognizant of this contribution and base appeal on it. They will have a broader role and financial support if they do so. Here they can point to accomplishments much more convincingly demonstrable as a basis for justification and financial appeal. There is some empirical indication that this appeal and contribution can be recognized by the consuming public, the main gaining sector from the contributions to development by agricultural colleges. Appropriations for the experiment stations and extension services generally are greatest in those states where agricultural production and population are small relative to industrial production and urban population. Appropriations tend to be smaller the greater is the proportion of state income represented by agriculture. In fact, state appropriations for agricultural

research in the "farm" states have declined greatly relative to "non-farm" states over the last three decades. More and more, agricultural research is becoming concentrated in the industrial states.

But our main concern here is in the ordering of research and education, and in gearing it better to national economic progress. Emphasis on research for technological progress of conventional types (e.g., the quantity facet, as compared to the quality-service facet without regard to magnitude of income elasticities) can be justified in the broad economic development framework outlined immediately above. Here it has the purpose of freeing resources from agriculture so that the nation can develop in other directions. But for this purpose, it is not sufficient that the resources be freed through biological and physical innovations and then left stranded. Under this condition they remain in agriculture producing a product. Under low demand elasticities, the result is surpluses, with depressed farm prices and incomes. Hence, if the general economic development goal is to be selected as the major justification of biological and physical research of conventional emphasis, it must be accompanied by equally intensive research in the social sciences, if the national development gains made possible by technical research are to be realized rapidly and fully, and if economic misery is not to impinge on those persons caused to become surplus resources as a result of rapid technological progress. Social science becomes an important technical complement with technical science for this goal of agricultural research and education. The former needs to be put on a footing with the latter, a condition which does not hold true in many Land Grant Universities. Social science should not be increased at the expense of technical science, but rather increased in magnitude and financial support to the levels which have more often been traditional for the physical science. The benefits of resource savings have no basis unless "freed" resources are transferred to occupational and geographic points where they have premium under economic growth. Too, there is great need for research and education on social mechanisms which not only allow this contribution through technical progress, but which also allow farm producers to realize some reward, rather than only short-run penalty, for the contribution they make to broad national consumer welfare. The investment in social sciences now needs to be large. Magnification of social sciences can actually aid and enhance the physical sciences. Without more intensive social science to help solve the surplus, excess factor and depressed income problems generated by rapid technical progress, technical sciences are much more likely to be restrained by lack of funds. Again, the question is not one of social science at the expense of technical science or vice versa. The problem is to develop total research and educational programs which are systematic

in the broad national developmental sense and which better guarantee positive-sum outcomes.

This augmentation is not best attained simply by addition of another agricultural economist in most Land Grant Universities. It needs to include a much broader investment in both economics and other social sciences. The lack is amazing, especially in regard to the latter. Sociologists, whose field is extremely relevant for the developmental goal and justification, are notable mainly for their small number and lack of public financing in most experiment stations. The rural sociologist, in competition with others in agricultural science, has had only meager recognition and funds.[6] Political science, local fiscal policy and related fields, all extremely significant in the shift of agriculture under economic growth, are seldom qualified to receive appropriations from the experiment stations and extension services. Not more than a dozen states have a vigorous extension program in agricultural policy. Broad research programs are even more scant. Investment in certain aspects of home and family economics is entirely too small for the purposes under examination.

A relatively higher public investment also is required to take a given amount of social science facts and understanding to people. This is true because social science research largely provides facts and principles for understanding and decision-making. Research results from most physical fields are awaited eagerly by private firms, so that they can package and place a brand name on them and send out a sales and advertising force.

*Emphasis on foreign economic development*

Somewhat similarly, agricultural colleges view research and education in foreign economies and development to be out of their realm. In most states, such projects are completely subordinated to small local projects, if they are supported at all. This is true even though (1) most agricultural colleges consider themselves to be working in behalf of farmers and (2) the single major basis for increasing farm income or for asserting the importance of increased agricultural productivity stems from developments in international markets and institutions which allow the hunger and population problems of other countries to be solved through supply from U.S. agriculture. If the sole goal of agricultural research and education were farmer income, it might be best attained by shifting a large proportion of personnel and financial resources over to this investigational area and developing a break-through in large foreign markets for foodstuffs. In balance with other goals and among the relevant sciences, so large a shift is not needed or desired. But certainly more emphasis and work in

[6] We are talking about the general situation, and not the environment of particular institutions.

this direction is desirable, especially in terms of free world challenges and goals.

### *The Broad Role and Appeal*

The time has come, in fact, when the agricultural colleges should see themselves in the broad framework of contemporary American society and its problems. There is need and opportunity for greater role and support than at any time in previous history. The agricultural colleges represent resources not only for promoting domestic economic growth, but also for attaining the international goals and responsibilities of the nation. A responsibility necessary and assumed by the nation is promotion of economic development in countries of less progress. This responsibility and intermediate goal will grow in emphasis because of (a) growing world public opinion that all peoples can and should be freed from hunger and that they have the right of self expression and (b) interrelated world political and economic competition. In furthering these long-run goals, and if the broad public role should be taken seriously in agricultural colleges, personnel in both the technical and social sciences should be allocated much more to international problems. Here we have in mind not so much the ICA-type of engagement, hardly considered an on-campus activity of most institutions, but rather an activity which is an integral part of the on-campus efforts. For example, a research worker at College X would be assigned as directly to development improvements for a foreign location as his colleague in developing an improvement for a particular county in the state. But this is a development, however important, which currently lies outside the financial and jurisdictional opportunities of the states, either singularly or collectively. It must await intensification and clarification of emphasis. Still, administrators in Land Grant Universities, and the organization of these institutions, can collectively aid and influence national leaders in developing the opportunity for this appropriate societal use of the extremely significant resources represented by the agricultural colleges.

#### *Appeal to consumers*

In a similar but less far-reaching vein, the college administrators need to attack the problems of broad national recognition, justification, and support of the agricultural college system. This is a task which is not best accomplished by individual states, but by a comprehensive approach of the system. It was scarcely needed a century ago when the agricultural colleges were initiated. Most of the population were farmers and the important portion of the nation's resources was used in farming. Agriculture generated the most important single component of national in-

come. The status of economic development, per capita income, population growth and demand elasticities were such that the agricultural colleges most directly and conveniently could appeal only to farm people for support and justification. National benefit and aggregate farm profit gains from advance in agricultural technology were highly consistent. But today's picture is far different. Net farm income now represents less than 5 percent of the nation's disposable personal income. Roughly 8 percent of the population and labor force are on farms. Excluding land, only 16 percent of the nation's capital is used in agriculture. Demand elasticities are at levels causing aggregate farm income to decline with rapid increase in aggregate output. In another 25 years, the farm labor force may be less than 5 percent of the national labor force and net farm income may be only 2 percent of disposable personal income. The numerically great and economically significant sector of society benefiting from agricultural college research and education will be the consumer. One hundred percent of the population will have contact as food consumers and households, but a small and declining fraction of the nation's resources and producers will have any tie to the efforts of the agricultural colleges. Without wider recognition of this fact and that the true role of the agricultural colleges is in behalf of the consumer and national economy, and without financial appeal and programs bent more in this direction, the institutions stand to face an increasingly difficult "uphill climb" in competition for public funds. The change in structure, composition and "marginal consumer urgencies" of current American society suggests the need for speed in this direction. It is not, in fact, as easy to justify the agricultural colleges in terms of the national economic development goal as it once was. For example, to have technical advance which reduced the 1920 agricultural labor force of 12.5 million by 45 percent to 1960, with this related to a 1920 national labor force of 40.3 million persons, was a contribution of great magnitude. To have technical advance which frees 45 percent of the 1960 farm labor force of less than 7 million, and adds it to a national labor force of 70 million, is much less significant.

### *Distribution and Financing of Research*

Change is suggested not only in overall structure of agricultural college programs, but also may be desirable in regional pattern of specialization and financing. To the extent that demand elasticities were high enough to cause farmers in the aggregate to benefit directly from technical advance and greater output a century back, it was highly consistent that farmers and citizens of farming states be asked to provide the main funds to support the corresponding research. With a different status of national economic development and demand elasticities, and with the major bene-

ficiary being the consumer, it is now less appropriate that farmers and citizens of the agricultural states be asked to finance the research to benefit consumers in other states, although this is the broad pattern which exists for state funds used in research and education. Should not a much greater proportion of funds aimed at technical improvement be obtained on a national basis, with the pattern corresponding more consistently to consumer concentration, then be allocated back to states on the basis of concentration in agricultural production, with research conducted accordingly? Or more specifically, should we ask Kansas wheat farmers to pay for technical research which largely benefits Bronx consumers? For the latter question, given the current day distribution of benefits from improved agricultural technology, an affirmative answer would not seem most appropriate. The preferred source and allocation of financing would allow research and education to be emphasized and conducted more in line with the regional concentration of agricultural production over the nation. In contrast to the trend over the last two decades, a relative shift in magnitude of agricultural research funds from agricultural states to industrial states, this pattern would result in a more productive application of the total national research investment.

# FARM LEGISLATION IN THE 86TH CONGRESS*

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IN THE Preface to his excellent study, *Congress Makes A Law*, Stephen Bailey speaks of our national legislative process as follows: "For most Americans the drama of Congressional policy-making is played behind closed curtains. It is much as though the citizenry were seated in a huge auditorium, allowed printed programs, but kept in almost total ignorance of what was happening on the stage."[1] One might well contend that he exaggerates the existing situation, but the picture he portrays certainly contains several elements of realism. The purpose of this article is to attempt to pull aside the curtain so that we may have at least a partial view of what happened in the areas of farm legislation in the 86th Congress (1959-60).

The results of the November 1958 election brought about a substantial increase in the strength of the Democratic Party in Congress, or the statistics seemed to so indicate. In both houses there was an almost two-to-one majority, and the general consensus seemed to be that such a majority meant that much legislation would be forthcoming. Table 1 indicates the rather modest accomplishments that were actually brought about.[2] In fact, other than the extension of Public Law 480 through 31 December 1961 (Titles I & II expire on that date), there was not much done of any major significance.

Why were the accomplishments in the area of farm legislation so comparatively modest? In an attempt to answer that question we will, first, take a look at the organization of the House and Senate Committees on Agriculture (and Forestry, in the Senate); secondly, a tabular sum-

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Dr. Walter W. Wilcox, Senior Specialist in Agriculture, Legislative Reference Service, Library of Congress, and Professor Don F. Hadwiger, Southwest Missouri State College, read this paper in its first draft. Their comments and criticisms saved me from several errors of fact and judgment; those that remain are probably because of my failure to listen to their advice even more carefully than I did.

[1] Stephen K. Bailey, *Congress Makes A Law* (New York: Columbia University Press, 1950), p. vii.

[2] The data contained in the first 8 tables was extracted from the following official publications:

(1) Committee on Agriculture and Forestry, United States Senate, *Legislative Calendar—86th Congress*, Final Edition, No. 15, Dec. 16, 1960.

(2) Committee on Agriculture, United States House of Representatives, *Legislative Calendar—86th Congress*, Final Edition, No. 13, Dec. 20, 1960.

(3) Same source as (2) above, *Final Summary—86th Congress*.

TABLE 1. MAJOR FARM LEGISLATION BY THE 86TH CONGRESS

*I. Bills Enacted into Law*

*Export Programs*

H.R. 8609—Extension of Public Law 480 (Agricultural Trade Development and Assistance Act) (P.L. 86-341)
- Title I —Sales for Foreign Currencies (Through Dec. 31, 1961)
- Title II —Donations (Through Dec. 31, 1961)
- Title III—Food Stamp Plan (Through Jan. 31, 1962)
  Donations and Barter (Permanent)
- Title IV—Long-Term Contracts (Permanent)

Executive E and H.R. 8409—Extension of International Wheat Agreement Act of 1949 (P.L. 86-336)

*Price Support Programs*

H.R. 9664—Tobacco Price Supports (P.L. 86-389)

S. 2917—Price Supports for Milk and Butter Fat (Through March 31, 1961) (P.L. 86-799)

H.R. 12311—Extension of Sugar Act and authority of the President through March 31, 1961 (P.L. 86-592)

*Special Milk Programs*

H.R. 5247—Special Milk Program, expand to $78,000,000 through fiscal 1959 (P.L. 86-10)

S. 1289—To Increase and Extend the Special Milk Program for Children ($81 million for fiscal 1960; $84 million for fiscal 1961) (P.L. 86-163)

H.R. 9331—Additional increases to the Special Milk Program ($4 million for fiscal 1960, and $11 million for fiscal 1961) (P.L. 86-446)

*National Forests*

H.R. 10572—National forests, multiple use and sustained yield (P.L. 86-517)

*Farm Labor*

H.R. 12759—Extend Mexican Farm Labor Act until Dec. 31, 1961 (P.L. 86-783)

*Land Grant Colleges and Universities*

S. 3450—Increase the authorized appropriation for resident teaching grants to land-grant institutions (P.L. 86-658)

*II. Bills Passed by Congress and Vetoed by the President*

S. 1901—Price supports for tobacco (Amendments to the Agricultural Act of 1949) (Vetoed June 25, 1959)

S. 1968—Price support for wheat (90 percent of parity price supports and 25 percent reduction in acreage allotments, *or* 50 percent of parity price supports and unlimited production) (Vetoed June 1959)

mary and general analysis of committee and floor action will be advanced; and thirdly, a general outline of the major items of farm legislation that were enacted will be presented.

## *I. Committee Government*

Some 75 years ago Woodrow Wilson characterized our political system in the following well-known phrase: "Ours [is] a government by the Standing Committees of Congress."[3] Since that day the power of the President has been amplified times over, but on Capitol Hill the prescience of Wilson still holds forth. The crucial action in the legislative

[3] Woodrow Wilson, *Congressional Government* (New York: Meridian Books, reprint 1956), pp. 55-56.

TABLE 2. ORGANIZATION OF SENATE AND HOUSE COMMITTEES ON AGRICULTURE BY POLITICAL PARTY, GEOGRAPHIC AREA, AND SENIORITY ON THE COMMITTEE

| Geographic Area | Senate | | House | |
|---|---|---|---|---|
| | Democrats—11 | Republicans—6 | Democrats—23 | Republicans—12 |
| SOUTH | Ellender (La.) (1)<br>Johnston (S.C.) (2)<br>Holland (Fla.) (3)<br>Eastland (Miss.) (4)<br>Talmadge (Ga.) (7)<br>Jordan (N.C.) (9) | | Cooley (N.C.) (1)<br>Poage (Tex.) (2)<br>Grant (Ala.) (3)<br>Gathings (Ark.) (4)<br>McMillan (S.C.) (5)<br>Abernethy (Miss.) (6)<br>Albert (Okla.) (7)<br>Abbitt (Va.) (8)<br>Thompson (Tex.) (9)<br>Bass (Tenn.) (13)<br>Jennings (Va.) (14)<br>Matthews (Fla.) (15)<br>Stubblefield (Ky.) (19)<br>McSween (La.) (20) | Belcher (Okla.) (3) |
| MIDWEST (Inc. Northern Great Plains) | Humphrey (Minn.) (5)<br>Symington (Mo.) (6)<br>Proxmire (Wis.) (8)<br>Young (Ohio) (10)<br>Hart (Mich.) (11) | Young (N.D.) (2)<br>Hickenlooper (Iowa) (3)<br>Mundt (S.D.) (4)<br>Schoeppel (Kan.) (6) | Jones (Mo.) (10)<br>Johnson (Wis.) (12)<br>McGovern (S.D.) (16)<br>Coad (Iowa) (17)<br>Breeding (Kan.) (18)<br>Hogan (Ind.) (21)<br>Levering (Ohio) (22) | Hoeven (Iowa) (1)<br>Smith (Kan.) (6)<br>Quie (Minn.) (8)<br>Short (N.D.) (9)<br>Latta (Ohio) (12) |
| NEW ENGLAND /MIDDLE ATLANTIC | | Aiken (Vt.) (1)<br>Williams (Del.) (5) | | Dague (Pa.) (2)<br>McIntire (Me.) (4)<br>Pirnie (N.Y.) (11) |
| WEST | | | Hagen (Calif.) (11) | Dixon (Utah) (5)<br>Teague (Calif.) (7)<br>May (Wash.) (10) |
| WEST INDIES | | | Fernós-Isern (P.R.) (23) | |

process (excluding the President, for the time being) is in Committee. The many reasons for this prevalent condition have been explained time and again so there need be no call for reiteration. The Wilsonian hypothesis has been tested and found only partially wanting.

Table 2 shows quickly and precisely the measure of Southern dominance in the Agriculture Committees. The Midwest and Great Plains areas are well represented, in both political parties; the rest of the table speaks for itself. If we examined the personnel make-up of the House and Senate Committees on Interior and Insular Affairs, the West would be prominently in evidence, but such is not our task herein.

Furthermore, it should be noted that the seniority rankings (Table 2) are quite important. Again, Southern hegemony is even more pronounced than mere numbers would indicate. The importance of the seniority factor is born out even further by Table 3. In most instances the initial and crucial actions on a bill are made in subcommittee, and the Southern members clearly control the subcommittee chairmanships, notably in the House Committee. The few truly major bills often receive their initial action by the full committee so one should not exaggerate the importance of sub-committee action, but, in terms of work load, the

subcommittees are of signal prominence in the legislative process.

Organizational charts are probably always deceptive in terms of pointing out the variegated power centers that exist therein, and these committees are no exception, but comments thereon will be delayed until Section III.

### *II. A Tabular Analysis of Committee and Floor Action*

The following tables are perhaps analogous to Simmel's definition of a philosopher—they articulate what we already know. Nevertheless, the evidence contained in the tables seems to provide empirical verification of the hypothesis that the crucial action in the legislative process occurs at the committee level. In some instances, the intricacies of legislative procedure have been such that the data in the tables is not completely reconcilable, but it is considered adequate for the purposes intended.

Table 4 is rather self-explanatory. It indicates that the members of the political party which controls the Congress are the ones who introduce the bills which become law, as would be expected. More importantly, these bills were, for the most part, introduced by Democrats

TABLE 3. CHAIRMEN OF SUBCOMMITTEES, HOUSE AND SENATE COMMITTEES ON AGRICULTURE

| Subcommittee | Chairman and State |
|---|---|
| I. House (Chairman Cooley and Mr. Hoeven, ex officio members of each subcommittee) | |
| Commodity subcommittees | |
| Cotton | Mr. Gathings (Ark.) |
| Dairy and Poultry | Mr. Johnson (Wis.) |
| Forests | Mr. Grant (Ala.) |
| Livestock and Feed Grains | Mr. Poage (Tex.) |
| Peanuts and Oilseeds | Mr. McMillan (S.C.) |
| Rice | Mr. Thompson (Tex.) |
| Tobacco | Mr. Abbitt (Va.) |
| Wheat | Mr. Albert (Okla.) |
| Special action subcommittees | |
| Conservation and credit | Mr. Poage (Tex.) |
| Departmental Oversight and Consumer Relations | Mr. Jones (Mo.) |
| Domestic Marketing | Mr. Grant (Ala.) |
| Equipment, Supplies, and Manpower | Mr. Gathings (Ark.) |
| Family Farms | Mr. Thompson (Tex.) |
| Foreign Agricultural Operations | Mr. Poage (Tex.) |
| Research and Extension | Mr. Abernethy (Miss.) |
| II. Senate (Chairman Ellender, ex officio member of each subcommittee) | |
| Soil Conservation and Forestry | Mr. Eastland (Miss.) |
| Agricultural Credit and Rural Electrification | Mr. Holland (Fla.) |
| Agricultural Production, Marketing, and Stabilization of Prices | Mr. Johnston (S.C.) |
| Agricultural Research and General Legislation | Mr. Humphrey (Minn.) |
| Special Agriculture Investigating Subcommittee | Mr. Symington (Mo.) |

TABLE 4. FARM LEGISLATION ENACTED BY THE 86TH CONGRESS

| | | | |
|---|---|---|---|
| Public Laws | 42 | Private Laws | 5 |
| 1st Session | (17) | 1st Session | (1) |
| 2nd Session | (25) | 2nd Session | (4) |

Who introduced the bills (including resolutions) that became Law?

| | House | Senate | Totals |
|---|---|---|---|
| Democrats | 18 | 19 | 37 |
| Republicans | 1 | 4 | 5 |
| No sponsor (by request) | | 2 | 2 |
| Bi-partisan sponsorship | | 3 | 3 |
| Totals | 19 | 28 | 47 |

How many of these bills were introduced by members of the Senate and House Committees on Agriculture?

| | House | Senate | Totals |
|---|---|---|---|
| Democrats: | | | |
| Members | 16 | 8 | 24 |
| Not members | 2 | 11 | 13 |
| Republicans: | | | |
| Members | 1 | 4 | 5 |
| Not members | 0 | 0 | 0 |
| Bi-partisan | | 3 | 3 |
| Totals | 19 | 26 | 45 |

TABLE 5. SUMMARY OF THE LEGISLATIVE CALENDAR OF THE HOUSE COMMITTEE ON AGRICULTURE

Measures docketed—847
- Bills (797)
- Joint resolutions (39)
- Concurrent resolutions (10)
- House resolutions (1)

Duplicate bills and resolutions—421
Superseded bills—48
Companion (Senate) bills—104
Senate bills docketed—31

Initial action on bills by full committee—24
Bills referred to subcommittees—192
Bills reported by subcommittees to full committee—36
- With amendments (17)
- Without amendments (19)

Bills reported by full committee to the House—57
- With amendments (35)
- Without amendments (22)

Reported bills that passed in the House—43
- With amendments (14)
- Without amendments (26)
- Senate bills passed in lieu of (3)

Reported bills that were defeated in the House—1 (H.R. 12261)

on the Agriculture Committees. The sizeable number of sponsors of Senate bills who were not committee members can be accounted for by the fact that the Senate permits joint introductions of bills; the House does not, and this difference in procedure helps to explain why more legislation, particularly identical bills, is introduced in the House than in the Senate.

Table 5 is somewhat more complex and requires some interpretation and elaboration. The number of bills and resolutions sent to the House Committee (847) points to the volume of work involved. (Bills and joint resolutions, if properly passed, have the force of law; concurrent and House or Senate resolutions are statements of policy—with few exceptions.) However, almost half of these bills sent to the House Committee were "duplicate," or identical bills; that is, the bills were identical, or nearly so, in content with an earlier bill. It would appear that the House could save a considerable amount in printing costs by permitting joint introductions, but to do so would deprive the members of excellent campaign propaganda. "Superseded" bills simply mean that a later bill nullified one introduced at an earlier date; "companion" bills are the same as "identical" bills except they are introduced in the other house, often for no reason again other than for their campaigning value, although in certain instances this technique is used to expedite action on a particular bill.

Also, Table 5 points up the importance of subcommittee action and, more significantly, of the decision of the full committee. This study does not attempt to find out why the House did not act on 13 of the bills reported out of committee. Perhaps it was not possible to get a favorable rule out of the Rules Committee, or it may well have been that Chairman Cooley did not really want a rule. At this stage, so much of the drama Bailey refers to is carried on by private conference, or by telephone, that the researcher has to rely on fragmentary data for his answers. The matter of amendments is also pertinent; the difficulty here is the matter of the qualitative significance of the amendment. Some, obviously, can provide for major substantive change, while most are procedural in nature or simply are permitted in order to appease some Representative who has a particular "local" situation.

Table 6 pertains to the action by the Senate Committee, and the outstanding feature of this table is the importance of the subcommittee and committee action. In brief, if a bill was reported out of committee to the Senate for floor action it passed, almost without exception.

Table 7 is subject to varied interpretations. The passage of a bill by one house did not insure its acceptance by the other, particularly so as regards the House Committee's action on Senate bills. However, if the

TABLE 6. SUMMARY OF THE LEGISLATIVE CALENDAR OF THE SENATE COMMITTEE ON AGRICULTURE AND FORESTRY

| | |
|---|---|
| Measures docketed—216 | |
| Bills | (204) |
| Joint resolutions | (6) |
| Concurrent resolutions | (1) |
| Senate resolutions | (5) |
| Measures with co-sponsors—77 | |
| Bills | (73) |
| Joint resolutions | (3) |
| Senate Resolutions | (1) |
| Bills introduced by request—28 | |
| Bills *not* referred to subcommittees—10 | |
| No further action | (5) |
| Reported to Senate | (5) |
| Bills reported by full committee to Senate—44 | |
| With amendments | (20) |
| Without amendments | (24) |
| Reported bills that passed in the Senate—42 | |
| With amendments | (17) |
| Without amendments | (21) |
| House bill substituted | (4) |

respective committees chose to report out the bill the chances for passage approached perfection.

Conference committees are appointed by the presiding officers in each house to reconcile differences in the same legislative measure. The data in Table 7 would indicate that the House was inclined to accept the

TABLE 7. HOUSE ACTION ON SENATE BILLS

| | |
|---|---|
| Referred to House Committee on Agriculture—31 | |
| Reported to House | 15 |
| With amendments | (3) |
| Without amendments | (12) |
| Passed House | 15 |
| With amendments | (3) |
| Without amendments | (7) |
| House bill substituted | (5) |
| Not Referred to House Committee on Agriculture—8 | |
| Passed House | 8 |
| With amendments | (3) |
| Without amendments | (5) |
| SENATE ACTION ON HOUSE BILLS | |
| Referred to Senate Committee on Agriculture—25 | |
| Reported to Senate | 17 |
| With amendments | (8) |
| Without amendments | (9) |
| Passed Senate | 17 |
| With amendments | (8) |
| Without amendments | (9) |
| CONFERENCE COMMITTEE REPORTS—8 | |
| House Agreed with Senate Changes—(6) | |
| Both Houses Concurred with Conference Report—(2) | |

TABLE 8. USDA REPORTS ON BILLS TO SENATE/HOUSE COMMITTEES ON AGRICULTURE

| Summary of all reports by USDA | House | Senate |
|---|---|---|
| Reports requested | 193 | 174 |
| Reports received | 179 | 153 |
| Favorable | (22) | (17) |
| Favorable, if amended | (29) | (19) |
| Unfavorable | (111) | (108) |
| Neutral | (17) | (9) |

| Summary of USDA reports on bills that were enacted into law | House | Senate |
|---|---|---|
| Favorable | 6 | 7 |
| Favorable, if amended | 3 | 8 |
| Unfavorable | 1 | 2 |
| Neutral | 2 | 1 |
| No report requested | 7 | 3 |

| Summary of USDA reports on bills passed, major farm legislation (see Table 1) | House | Senate |
|---|---|---|
| Favorable | 0 | 0 |
| Favorable, if amended | 0 | 0 |
| Unfavorable | 0 | 3 (2 vetoed) |
| Neutral | 2 | 1 |
| No report requested | 4 | 0 |
| No report submitted | 0 | 1 |
| Voluntary report | 1 | 0 |

changes which the Senate desired, but the evidence is too scanty to permit of any generalization.

If a bill is of any importance the usual practice of Chairmen Ellender and Cooley is to request a report (analysis and recommendation) on the particular measure from the Department of Agriculture. One must remember that the 86th Congress was controlled by the Democrats but the Executive branch was under Republican domination. Table 8 indicates that Secretary of Agriculture Benson was most reluctant to submit "favorable" reports to the Committees. That is, the number of "unfavorable" reports far out-numbered the others. The operations of our presidential system of government become increasingly complex when the executive branch is controlled by one party, the legislative by the other. Such was the situation here. Generalizations are hazardous at this point, but it would appear that an "unfavorable" report was a potent forewarning of a subsequent veto; any other recommendation might be treated as the committee desired.

Again, the outstanding feature of all the tables is the cruciality of committee action. All other actions in the legislative process recede into the shadows of the less important. This does not mean, however, that a Congressional committee does as it wishes. We must not confuse action with cause. The prestige of the committee is at stake, especially the chairman's. The political question that must be asked is: Will this bill

pass the House or Senate (as the case may be)? An important test of political skill is the calculations, considerations, and compromises that are made at this point in the legislative process.

### *III. The Actors and the Action in the Drama*

Legislative organizations and statistics are the products of men's desires and aspirations. Politicians, both of the elective and the employed variety, play the different roles within this human drama. Tocqueville believed that actions were brought into play inside "a fatal circle," within which men were free to govern the decision-making process.

Whether the circle is fatal or not is clearly a disputed proposition but one which will not be pursued herein. On the political stage, however, one finds a rather vast collection of groups which bring to bear on the congressional scene certain interests, ideologies, and personalities. These groups—public and private—are the instigators, the initiators, the innovators of public proposals. The Congress, and notably the committees, is the catalyst—"an organizer of combinations, especially political," as someone has remarked. Again, there is the danger of overstating the situation. Some members of Congress are pretty much lobbyists for particular interest groups but, in general, the pluralism of interests within the member's own district or state requires that he also be a small-scale "organizer of combinations."

Let us now give a rather general outline of the cast in this drama. Of the public interest groups—that is, the executive agencies of the Federal Government—the U.S. Department of Agriculture, and within it a collection of smaller interest groups, more and more plays the strategic role of the innovator. In the 86th Congress this role was the source of continual frustrations because Secretary Benson desired to innovate in directions which the Congressional Democrats, and some of the Midwest Republicans, were not willing to accept. As already intimated, other public interest groups in the area of farm policy would be the Farm Credit Administration and a few of the unofficially semi-independent agencies within the USDA, such as the Forest Service and the Rural Electrification Administration. The Bureau of the Budget would evidently like to have played a more active role in regards to farm policy, notably in the area of reduced budgetary costs, but the organized strength of the farmer on the Hill was more opposition than the Bureau could overcome.

The imposing and powerful private farm interest groups have been an influence in Congressional politics since the early 1920's. Considering the relatively small, albeit stable, number of commercial farms in the United States (2,063,778 farms producing over $2,500 gross in farm products, according to the 1959 census) it would seem correct to state that farmers are the most effectively organized of all groups of the American society.

Their inter-organizational disunity is certainly a debilitating factor, but the legislative accomplishments have been impressive. The long run issue evolves around the diminishing political power of the farmer and what this protends for his political future. The urban members of Congress and the urban housewives are becoming more influential in the area of farm policy with each passing biennium.

Although the list is only partial, the farm interest groups that were most prominent in the 86th Congress were the American Farm Bureau Federation, National Farmers Union, National Grange, National Association of Wheat Growers, National Milk Producers Federation, National Cotton Council, and some of the tobacco organizations. Organized business and organized labor are oftentimes concerned with farm legislation, and nearly always they are in opposition to each other. The National Farmers Union has a rather firm ally in the labor interests; the Farm Bureau receives its firmest support from the business interests; the Grange is apprehensive of the strength of labor unions but, during the 86th Congress, usually worked with the Farmers Union on issues other than minimum wages, migratory labor, and the like.

Thus, the contention is that the impetus in the legislative process comes from the public and private interest groups. The brokers in this political drama are the key persons in Congress—primarily, Chairmen Cooley and Ellender, the sectional partisans who conduct the subcommittee actions, and the majority and minority party leadership in the House and Senate. Congressional government is not party government, at least not of the British type, but this reality should not carry with it the belief that the Congressional parties are impotent and that each standing committee is an autarchy unto itself. Such are not the facts of our political life.

A. *The politics of acceptance*[4]

*(1) Extension of Public Law 480 (P.L. 86-341).* Public Law 480—formally the Agricultural Trade Development and Assistance Act of 1954—was to expire on 31 Dec. 1959. That it would be renewed again there was little doubt. The issues were: for how long, and in what directions? President Eisenhower requested a one year extension, apparently upon the advice of Secretary Benson. The Farm Bureau concurred with, perhaps inspired, the Administration's request. At the other extreme of the scale of possible revisions was the Food for Peace Act of 1959 (S.1711),

[4] The sources for Section III were:
(1) *Congressional Quarterly* (pertinent issues for 1959-60).
(2) *Congressional Quarterly Almanac,* Vol. XV (1959) and XVI (1960).
(3) House and Senate Committees on Agriculture, *Committee Reports* (for all bills reported out of both committees).
(4) Personal Interviews; early Jan. 1959, and June 1960, in Washington, D.C.

which was introduced by Senator Humphrey and 15 of his colleagues. The Humphrey proposal would have been more expensive than the existing act (S.1711 authorized $2 billion a year for 5 years under Title I); it would have been a long range program with certain contractual obligations extending for a 10 year period; and there would have been a bureaucratic shift in that a new Peace Food Administration would have been established to carry out the program.

The Departments of Agriculture and State opposed the Food for Peace Act; so did the Farm Bureau. Humphrey, more than likely, introduced and pushed for the bill largely as a bargaining wedge—which it turned out to be.

An anomaly in the finally enacted legislation was the inclusion in Title III of a food stamp plan. There was hardly anything new about the food stamp idea. It had been a reality in the late 1930's and Senator Aiken had introduced some version thereof in every Congress since 1944. It slipped in at this point largely as a rider. Perhaps its inclusion garnered some metropolitan labor support which the extension of Public Law 480 would not have had otherwise. The Senate version of the food stamp plan authorized an appropriation of $20 million a year and the program was to be instituted in six depressed areas, with a requirement that the Secretary of Agriculture implement the legislation. The House bill authorized a $1 billion appropriation but made the program permissive on the part of the Secretary, and required that the program should be established in an area only if requested by a state, county, or municipal government. The conference report called for a $250 million authorization, but the request and permissive features remained in the bill. Benson made it plain that he had no intention of implementing such legislation if it was not mandatory; therefore, the provision was more useful for campaigning than as food.

In briefest outline, the final enactment (P.L. 86-341, Sept. 21, 1959) provided for an authorization of $1.5 billion a year for two years under Title I, and $300 million a year for grants under Title II; the food stamp plan was slipped in under Title III, along with a broadening of the barter provisions; and Senator Humphrey's proposal was included, in part, as Title IV, in that surplus farm commodities could be sold for dollars under contracts ranging up to 10 years and with payments extended for a 20 year period.

There had been some repercussions against the 480 program, notably from other foreign export nations and because of certain features of the barter program, but the political ingredients for an extension were abundantly in evidence. To the domestic interest groups, at least for most of the farm organizations and those who wanted to use food to barter for strategic materials, the 480 program enabled the United States

to make international virtue out of a domestic necessity. Also, organized labor was pressuring for an expanded use of surplus commodities domestically; certain members of Congress wanted to aid the depressed areas; presidential candidates were preparing for the coming primaries; and Mrs. Leonor Sullivan (3rd District, Missouri) was displaying one of the innate qualities of all womanhood—she demanded (in this instance a food stamp provision), and she received. The Farm Bureau was somewhat fearful of its step-child and the Farmers Union was impressed with the Food for Peace Act, but a compromise was forthcoming and, in fact, was almost inevitable. The peripatetic chairmen of the House and Senate Agriculture Committees looked upon P.L. 480 as a benevolent progeny, and the vice-chairman of the House Committee probably even exceeded them in his paternalism. Most important, perhaps, was the horde of farm surpluses which existed, especially of wheat and cotton, which we needed to dispose of and which—at bargain or giveaway rates—others were willing to buy.

As addenda to this explanation of P.L. 480 there might be added a brief comment about the Mutual Security Acts of 1959 and 1960: both required that at least $175 million of mutual security funds be used to finance sales for foreign currencies or grants of surplus farm commodities. Also, the Senate ratified a 3 year extension of the International Wheat Agreement Act of 1949, which was to expire on June 30, 1959. Implementing legislation was required and forthcoming when both houses passed H. R. 8409 by voice vote.

*(2) Tobacco (S. 1901 and P.L. 86-389).* The tobacco price support program met with both failure and success. There seemed to be general agreement that American tobacco was pricing itself out of the world market but there was much less concurrence as to a course of action. Congress, in 1959, did pass S. 1901, which would have maintained tobacco at 90 percent of parity but would have re-instituted the old 1919-29 base period. Actually the new-support price would have slightly lowered tobacco supports, but the Administration and the Farm Bureau viewed with trepidation what they considered to be a regressive step. Apparently what Senator Jordan referred to as "the tobacco farm organizations" supported S. 1901, but Eisenhower vetoed the bill. With a 250-149 vote in the House for original passage to reflect on, the Congressional leadership decided that no further action was expedient.

H. R. 9664 was introduced and passed in 1960 and, reluctantly, was accepted by the Administration. Support prices for 1961 and subsequent crops of tobacco were to be adjusted according to the percentage change between the 1959 parity index and the average of the parity indexes for the three calendar years just preceding the year for which supports were being determined. There was seemingly a lot of backstage political

maneuvering on this bill. Hearsay evidence was prevalent that the State Farm Bureaus in the South, notably North Carolina, had informed the AFBF to either accept the tobacco bill or expect a major internal ruckus. Be that as it may, the bill passed and was not vetoed.

The Southern Democrats were able to achieve their objectives: the tobacco group's desires concerning parity were upheld, price support increases were prevented—temporarily at least—and the Secretary of Agriculture was granted no additional authority over the tobacco program.

*(3) Special milk programs (P.L. 86-10, 86-163 and 86-446).* Since the Agricultural Act of 1954, Congress has provided funds each year for the special milk program. A measure of this type seems to have many of the essential elements necessary for a new proposal to become legislation: need—the milk goes to the school children and to certain types of nonprofit welfare institutions; political support—the National Milk Producers Federation apparently fostered the bill and certain members of Congress (notably Lester Johnson, Wisconsin) have given it diligent and fatherly support over the years; excess supply—like several other farm products, we have an abundance of milk. This is the type of program which acquires an aura of political sanctity. One can observe a sort of Parkinson's first law of spending in operation and conjecture as to the future of the special milk program. For fiscal 1955, $17.1 million was spent on the program, then $45.9 million in 1956. In the 86th Congress, two of the laws (Public Laws 86-10 & 446) authorized an increase to the appropriations that were already passed for fiscal years 1959-1961.

Originally, the plan seemed to be to increase the annual appropriations by a sort of built-in inflationary factor, with the inflation in this instance to be in the form of additional school children. However, what has happened is a blanketing-in of new categories and an extension of coverage so the escalator clause (projected to be a $3 million increase each year) has proved insufficient.

*(4) National Forests (P.L. 86-517).* H.R. 10572 was clearly an Administration bill. From the flurry of activity relative to bills pertaining to multiple use and sustained yields, one might have thought the crisis was genuine. Fifty-two identical or similar bills were introduced in the House. Chairman Cooley could easily have placed his name on the bill and made it the one to be acted on but he accorded the privilege to Congressman Grant (Ala.). There was little opposition to the bill; one minor amendment was forthcoming from action of the committee. In substance, this bill gave the Forest Service the authority to do what it had already been doing for some time.

*B. The politics of stalemate*

*(1) General farm legislation.* The 86th Congress did not provide the political climate for the passage of a new general farm program. The theory of separation of powers was functioning, in a real sense: power was being checked by power; whether this could be termed a balanced government is a matter of some doubt. Those who favor genuine party responsibility could use this episode to prove, at least to their satisfaction, that the existing structure of political institutions was inadequate for the achievement of the national purposes. Others would view the situation as one which reflected the desires of the electorate and, although admittedly a little sticky, demonstrated that the split party control of the Presidency and Congress could be met through an added injection of American pragmatism.

The Metcalf bill (H.R. 2490), apparently the creation of the National Farmers Union, was introduced in January, 1959. There were some 183 pages of provisions and it would be generally accurate to state that the bill permitted the use of most any known device in order to improve farmer income and advance the utilization of farm products. It was introduced for "educational" reasons, that is, the NFU wanted to discover the public reaction to the bill and, more importantly, to seek out such political allies in Congress as could be garnered. The USDA gave the measure an unfavorable report; no hearings were held—in fact, the bill was not even referred to a subcommittee.

By early 1960 the NFU and some of its Democratic supporters in Congress were ready to make a more serious political drive for a comprehensive farm bill. Congressman Poage, Vice-Chairman of the House Committee on Agriculture, introduced a bill entitled the Family Farm Income Act of 1960 (H.R. 10355). To appease the Southern and Western Congressmen the bill called for the continuance of the existing tobacco, sugar, and wool programs. Cotton and wheat programs were to be included under separate titles. In roughest outline, the main enabling provisions were: (1) nationwide marketing orders would be authorized for nearly all farm commodities, (2) national commodity stabilization programs could be devised by producers and, with the approval of the Secretary of Agriculture, Congress, and two-thirds of the producers, put into operation, (3) the soil bank program, in amended form, would be extended, and (4) the public distribution of high protein foods would be increased.

Behind and in front of the scenes this bill kept coming unhinged. The cotton interests pulled out; the USDA treated it with the veto of silence; the Farm Bureau denounced the provisions openly; the Grange was

reluctant. The strategy came to be one of attrition, a slow retreat in the hope of picking up enough new support to bring about the required votes.

This political situation brought about the Family Farm Act of 1960 (H.R. 11769), which excluded cotton and sought for the support of the wheat growers in a new Title IV section which called for 85 percent of parity supports on wheat with a 25 percent cut in acreage allotments and payments on reduced acres of 55 percent of average yield. This bill was voted down by the full committee—all the Republicans were in opposition and 8 of the Democrats.

The next stand came in May with H.R. 12261—the Farm Surplus Reduction Act of 1960. Its demise will be explained in the following section. The bill was concerned with more than wheat, but political defeat came because the wheat groups and the wheat Congressmen could not arrive at a modus vivendi; their agreement would probably have brought about a favorable vote in the House, at least.

The Farm Bureau was relentless in its opposition to these general farm legislation proposals. No doubt their reasons were several, but one should be mentioned: the elected producer groups, which would formulate the various commodity programs, might well prove to be a way to circumvent and disregard the wishes of the nation's largest farm organization.

*(2) Wheat.* When the 86th Congress convened early in January 1959, the common rumor was that a wheat bill would soon be passed. The hourglass kept draining away, and so did the prospects of wheat legislation. With adjournment came the realization that the stalemate on wheat had not been broken.

It would appear that we have a superabundance of wheat, but to complicate the situation, the excesses are more of certain types than of others (hard red winter much more than soft spring and durum varieties). Furthermore, the wheat farmer is pinched, economically, but the existing program still provides a modest price floor; the weather has been from satisfactory to good; and crop yields have been on a rather steady incline. The situation seems to indicate the need for ameliorative legislation, but farmers usually are shrewd calculators. The present laws may not provide the best of all possible worlds, but many of the alternatives are more evil, in their opinion.

**S. 1968.** Congress did manage to pass a wheat bill (S. 1968) in 1959; the President then vetoed it. Succinctly, the House bill would have raised price supports on wheat to 90 percent, required the wheat farmer (above the minimum acreage) to retire 25 percent of his wheat acreage allotment, and compensated him for the land reduction by granting him a payment-in-kind equal to one-third the historical production of that land; or, the farmer could plant an unlimited acreage in wheat but price supports would be dropped to 50 percent. The "or" question was to

be resolved by referendum. The House bill passed 189-177 but, according to a *Congressional Quarterly* study, the "big city" members voted as follows:

| | *Yes* | *No* |
|---|---|---|
| Democrats ..... | 55 | 36 |
| Republicans ..... | 0 | 49 |

The Senate passed a sliding scale version (65 percent price supports, no allotments; 75 percent supports—10 percent acreage reduction; 80 percent supports—20 percent acreage reduction). The conference committee came forth with a single 80 percent supports—20 percent acreage reduction compromise which was approved by the Senate but defeated (202-214) in the House. Whereupon the Senate took up the original House bill and passed it (44-40). The President then used one of his powerful legislative weapons.

**S. 2759 and H.R. 12261.** Some 115 wheat bills were introduced in the House alone during the 86th Congress. Many were duplicates but there were some 15 different versions from which to select.

Within this collection, two important proposals for the alleviation of the wheat surplus stood out. The first (the so-called "domestic parity—two price support" approach) was developed by an alliance of the NFU, Grange, and National Association of Wheat Growers, and was supported by the National Farm Organization, Missouri Farmers Association, National Corn Growers Association, American Soybean Association and the Grain Sorghums Producers Association. Announced in March, 1960, the bill (H.R. 11011 and 12 other identical bills) was supposed to stabilize wheat marketing, improve the income of wheat producers, and reduce the CCC stocks of this grain. A "National Wheat Requirement for Primary Use" was to be set up (domestic consumption plus total wheat exports, minus 150 million bushels), distributed among the wheat producers on the basis of historical acreage, and supported at 75 percent of parity. However, marketing certificates were not required for excess wheat that might be sold for feed, and this provision worried the feed grain producers and brought on the denunciation of the Farm Bureau.

The second proposal was sponsored by the Farm Bureau, approved by Secretary Benson, and introduced by Senators Hickenlooper, Lausche, and Dirksen (S. 3336); companion bills were introduced in the House. This bill was essentially an extension of the Conservation Reserve Program for a three year period so that (in conjunction with the enactment of S. 3335) there would be a conservation reserve of 60 million acres by 1963, with 17 million of the additional acres to be from the wheat growing areas. Acreage allotments and marketing quotas for wheat were to be eliminated. For 1961, wheat price supports would not be less than 120 percent of the price support for corn.

Neither the House nor the Senate bills could garner sufficient political support to be reported out of committee.

The Senate finally passed during the second session (1960) a wheat bill which provided for price support at 75 percent of parity, a 20-percent acreage allotment reduction, and a payment-in-kind of 50 percent of the recent historical production if 20 percent of the remaining allotment was retired. The Senate had difficulty in reaching this decision partly because of Senator Ellender's opposition to an increase in wheat price supports. He lost in committee but won on the floor, to state the matter with brevity. Floor action became complicated because the Senate at first passed a bill which the Senate leadership (temporarily absent) could not accept politically. But Majority Leader Johnson was whisked back to the Senate and got the kind of bill he could accept.

The House Committee on Agriculture had been going through a process of gradually shrinking down the different general farm bills sponsored by Congressman Poage. The "domestic parity-two price" bills of the National Grange and National Association of Wheat Growers had some support, but the coalition of these two and several other interest groups kept coming untied. The National Farmers Union wanted general farm legislation which had the potential, at least, of stringent federal control of production. The Farm Bureau position has already been stated. Finally, H.R. 12261 did get reported out of committee. It called for, among other provisions, a wheat referendum to decide between two proposals: (a) 85 percent price supports—25 percent acreage decrease—55 percent payment-in-kind, or (b) no acreage controls—60 percent price supports for 1961, and 50 percent thereafter, approximately, coupled with a Conservation Reserve Program which would be increased to 60 million acres (that is, the Farm Bureau approach).

The House, first, refused by the close count of 195-211 to accept the Senate's wheat bill; then, by a 171-236 vote, the committee bill met a somewhat ignominious fate. According to the *Congressional Quarterly's* analysis, 4 of the 56 "big city" Democrats did not vote and 42 balloted against the Poage bill. Only nine Republicans voted for the measure, all of them from the Midwest. Not unimportantly, 23 Southern Democrats voted "no."

There were rumblings, threats, and evasive actions toward a new wheat bill following the post-convention session, but the Democratic leadership could not pass the kind of bill they wanted to campaign on.

*(3) The "Soil Bank."* The Conservation Reserve Program was permitted to expire by the end of 1960, that is, the pertinent provisions of the Soil Bank Act of 1956 were not renewed so no new land retirement contracts were to be entered into by the USDA.

The politics of "soil bank" legislation cannot be discussed in this paper

but the program was a victim of political circumstances.[5] The situation was rather parodoxical. Farmers were not, in general, opposed to the "whole farm" approach and the other land retirement features of the legislation. The opposition came largely from Southern Congressmen who were losing constituents; small town businessmen who were meeting with declining sales; the National Farmers Union, which did not oppose all forms of land retirement but only the "whole farm" variety; and general public reaction against certain situations, such as in New Mexico, in which at least a few persons and corporations were able to exploit the the program.

Several bills were introduced (13 in the House, two in the Senate) to extend the Conservation Reserve Program—nearly all of them at the instigation of the Farm Bureau—but the political facts of life would not permit any such renewal. This was temporary legislation, so stalemate meant defeat.

*(4) The Increased Use of Farm Products for Industrial Purposes (S. 690 & H.R. 8639).* One approach to the alleviation of the overproduction problem in American agriculture is through the increased use of the excess commodities for industrial purposes. Not that the approach is new at all; such efforts have long been under way within the USDA, the land grant system, and private industry. The issue was centered around tempo. There was substantial agitation for a more dynamic effort in this direction. The Senate had passed a bill in 1958 (S. 4100—85th Congress, 2nd Sess.) to establish a seven member Agricultural Research and Development Commission. The House had not acted on the measure.

On July 27, 1959, the Senate passed an identical bill (S. 690) to the one approved in the previous year. The vote was 76-7; all dissenting votes were Republican and the dissenters were from the Eastern states with the exceptions of Dirksen (Ill.) and Bennett (Utah). One hundred million dollars was authorized therein and the grant of authority to the Commission was quite broad—the use of incentive grants and loans to stimulate private industry to more vigorous efforts in this field and, if necessary, the construction and operation of manufacturing facilities for this purpose by the national government.

The House Committee on Agriculture had reported out H.R. 8639, which was a considerably more moderate approach to the problem. A seven member Agricultural Research and Development Commission was to be appointed by the President, after Senatorial confirmation, but the functions of the Commission were to be largely advisory; that is, to study

[5] See the paper by Donald E. Boles and Ross B. Talbot, "The Governmental Framework for Achieving National Land Use Adjustments," presented at the Conference on the Dynamics of Land Use, sponsored by the Center for Agricultural and Economic Adjustment at Iowa State University, May 3-5, 1960. The proceedings will be published in 1961 by the Iowa State University Press.

the nation's total agricultural research efforts, then to report annually to Congress and recommend new areas of research, especially in the area of increased industrial uses of farm products. The annual cost for the operations of this Commission was estimated at $200,000.

When S. 690 came to the House floor it passed by voice vote, but the provisions of H.R. 8639 were substituted for those in S. 690. Thus the bill had to go to conference committee, from which it never emerged.

Most of the private farm groups preferred the House bill. So did the USDA, except for the establishment of an independent commission rather than—as Secretary Benson preferred—an advisory committee within the USDA and only partially appointed by the commodity interests. The National Farmers Union supported the Senate bill.

*C. The politics of tentative action*

Congress on numerous occasions has found itself in a position where political prudence called for delay but where soon-to-expire legislation demanded action. Procrastination is a by-word in Congress, and oftentimes wise strategy, but in our national legislative halls it occasionally comes about because of built-in impediments. Our relatively weak system of party responsibility, the bicameral organization, the existence of powerful sectional and economic interests, the key role of the committees and their chairmen, all these and other factors often add up to a strategy of short run enactments in the legislative process.

*(1) Sugar (P.L. 86-592).* The intricacies and implications of proposed changes to the Sugar Act were seemingly endless, and this writer certainly does not have the information which would be required to unravel them. The Act was due to expire on Dec. 31, 1960, so action had to be taken. President Eisenhower asked for a four-year extension of the Act and blanket authority to decrease the quotas of foreign exporters, other than the Philippines. For one or many reasons, Chairman Cooley decided to play the role of the chief sugar diplomat. Constitutionally, it would appear that the amendments to the Sugar Act should emanate from the House Ways and Means Committee because it is, to a definite extent, a revenue measure. Tradition, however, along with Chairman Mills' reluctance to force the issue, has left the matter with the Agriculture Committee. Cooley persuaded the Committee to report out a one-year extension of the existing Sugar Act; then, after tremendous pressure was exerted, the Committee changed its mind and approved a bill which would let the President give Cuba whatever quota he decided upon. The Senate decided thereupon to give such authority to the President only for the remainder of 1960. Finally, the need for some kind of action led to the decision to extend the Act until March 31, 1961, and let the President do as he saw fit with the Cuban quota.

In fairness to Chairman Cooley, it should be noted that a form of temporary delay seemed to be the expedient course of action. The national interest, and certainly national concern, called for some decision regarding the Cuban quota, but to alter the status quo meant that other foreign export nations would demand an increase in their quotas, and the domestic sugar beet and cane growers—both actual and desirous—were clamoring for an increase in domestic allotments. Like patronage, one could make nine enemies while accommodating one friend. An election year was not the time to open Pandora's Box, even if hope remained.

Later, due to a resolution of the Organization of American States, the Administration requested (H.R. 13062) that the increased sugar allotment to the Dominican Republic be suspended. Chairmen Coooley and Ellender promptly came to the avowed defense of that sturdy "democrat" Trujillo and the outcome was—no action. The Administration covered its diplomatic embarrassment by increasing the duty by 2 cents a pound on sugar imported from the Dominican Republic, thereby deleting the subsidy involved, but the whole affair amounted to a useful example of how difficult it is for Congress to act in the area of foreign policy, particularly when important domestic interests are seeking a portion of the spoils.

*(2) Mexican farm labor program (P.L. 86-783).* Under the provisions of the Agricultural Act of 1949, workers are brought into the United States from Mexico under the supervision of the Department of Labor, and by international agreement with Mexico, to assist with certain seasonal farm operations in the United States. These provisions were to expire on June 30, 1961.

To complicate this issue further, there is the matter of the treatment of our domestic migatory farm workers. Secretary of Labor Mitchell had issued the bold threat in early 1959 that he intended to act administratively, under the provisions of the Wagner-Peyser Act of 1933, to improve the living and working conditions of these laborers.

Congressman Gathings introduced H.R. 12176 on May 11, 1960, in order to extend the Mexican Farm Labor Program and to deny the powers to the Secretary of Labor which he (Mitchell) claimed were his under the provisions of the Wagner-Peyser Act. The farm organizations, not including the National Farmers Union, moved to Gathings' support, or moved Gathings to act and promised their support. The opposition grew quickly, however. Some of it was from within Congress, but primarily the attack came from the AFL-CIO and several of the liberal church organizations, Catholic and Protestant.[6] The pressure was such that H.R. 12176 never

[6] The writer was in Washington, D.C., during June of 1960. One of the legislative representatives of a major farm organization remarked, "The Catholic Church killed this bill" (H.R. 12176). Certainly the Catholic Rural Life Conference was fighting the bill, but so were several other church organizations. (The *Congressional Quarterly*

reached the House floor; H.R. 12759 (Sisk, Calif.) was substituted and that bill pertained only to the Mexican farm labor issue. It did, by voice vote, pass the House and would have extended the program for two additional years. But the Senate reduced the extension to six months (Dec. 31, 1961), and the House accepted the proposal.

*(3) Milk and butterfat price supports (P.L. 86-779).* In what was quite obviously a bit of "campaign strategy," price supports on manufactured milk and butter were raised from 77 to 80 percent. The bill was not passed until the last day of August, 1960, and it was to expire on March 31, 1961. The immediate effect was probably limited because the market prices were already above the new support prices. However, this measure did increase the "floor." The Farm Bureau opposed the increase; Secretary Benson also deplored the action; but the President signed the bill. Such are the political realities which have to be faced during a Presidential election year.

*(4) Support for land grant college instruction (P.L. 86-658).* This bill is an authorization bill; no appropriation followed its passage. Nevertheless, the circumstances surrounding what will probably be known as the Ellender-Cooley bill are interesting, and they are important to an understanding of the legislative process.

In substance, the bill would increase the annual appropriations to the land grant colleges and universities under the provisions of the Bankhead-Jones Act of 1935 by $9,448,500. The addition of funds could be used in the teaching of the physical and biological sciences, engineering, mathematics, and veterinary medicine.

Apparently the bill germinated in the office of Chairman Cooley. A visit by a president of one of the land grant colleges and an ensuing discussion of the additional teaching costs due to increased enrollments and inflation culminated in the drafting of H.R. 10876 (passed under S. 3450). The bill moved smoothly and easily through both committees; the floor action was just as simple. Senator Ellender had apparently requested Senator Holland (Florida) to ask him a few explanatory questions when the bill came to the Senate floor, which he did. The whole process was fascinatingly easy, although it did leave one with some trepidation because of the swiftness of the action. Albeit, postponement was really the final result because no funds were appropriated to implement the legislation.

The farm organizations supported the bill; the Association of Land Grant Colleges and Universities assisted it through Congress, under the careful guidance of the committee chairmen. The Department of Health,

*Weekly Report*, March 31, 1961, p. 537, has a listing of the interest groups in favor of, and in opposition to, the extension of P.L. 78. The Farmers Union should be included in the "Labor-Welfare Bloc.")

Education, and Welfare entered the only divisive chord. HEW advised against passage of the bill because it constituted special legislation and was not aimed at what the Department termed "high priority needs."

*D. The need for appropriations*

The lifeblood of most legislation is money. If appropriations are not forthcoming, nearly 9 out of 10 legislative acts, it has been estimated, would be to no real purpose. Consequently, appropriation subcommittees are much feared and often respected. But the executive bureaucracies are so overwhelmingly better staffed than are the subcommittees that budget items, once accepted, tend to persist and usually increase over time. Congressmen do, however, have pet projects and peeves which slip into the budget process. A few of these can be pointed out by a quick review of Table 9.

The Chairman of the House Agriculture Appropriations Sub-Committee was adamantly in opposition to the Conservation Reserve Program and his efforts to decrease the appropriations for that program appear to have been particularly influential. Second, the Eisenhower Administration attempted in 1959 to reduce the advance authorization for the Agricultural Conservation Program from $250 million to $100 million, but the House subcommittee granted the original and usual figure, and the Senate concurred. In 1960, Senators Williams and Dirksen sought the same reduction but the Senate refused to accede. For several reasons, both ideological and political, the ACP program is considered to be sacrosanct by Congress, although the increasing urbanization of our national politics is weakening that condition.

Third, the ostensible attempts to economize by refusing to restore Commodity Credit Corporation capital in 1959 was primarily an effort to chastise the Commodity Credit Corporation for not selling more cotton competitively in the world markets, which the House subcommittee deemed to be both a necessary and a legally required action.

Four, the increase in appropriations for watershed projects was an obvious attempt by Congress to spur the USDA into more arduous endeavors within this program, regardless of the desires of the Bureau of the Budget.

Fifth, the Agricultural Research Service received additional funds largely because the Senate Appropriations Committee was more inclined to favor the establishment of new laboratories in certain states than was the Bureau of the Budget. The additional $10 million to AMS for fiscal 1960 was to repair a cut of just that amount in the school lunch program which, again, the Budget Bureau had imposed.

All in all, budget requests and appropriations were in rather close harmony during this period, but one can not properly generalize that

TABLE 9. AGRICULTURAL APPROPRIATIONS FOR FISCAL 1960 AND 1961

I. Summary

| Year | Departmental Request | House Action | Senate Action | Conference Report (Passed) | Major Changes From the Budget Request |
|---|---|---|---|---|---|
| 1960 | $4,081,364,863 | 3,939,165,498 | 3,975,775,148 | 3,971,362,673 | −$100,000,000—CCC<br>−25,000,000—Conservation Reserve Program<br>+4,500,000—SCS<br>+4,022,990—ARS<br>+10,000,000—AMS |
| 1961 | $4,135,263,190 | 3,964,781,500 | 4,000,222,863 | 3,994,097,600 | −98,500,000—CCC<br>−26,183,000—CRP<br>+10,500,000—SCS<br>+ 4,954,000—ARS |

II. By Intra-Departmental Units (USDA)

| Appropriations | *1960* | *1961* |
|---|---|---|
| Agricultural Research Service | $170,651,608 | $193,109,200 |
| Extension Service | 64,123,222 | 67,431,000 |
| Farmer Cooperative Service | 615,800 | 620,000 |
| Agricultural Conservation Program | 241,500,000 | 242,000,000 |
| Soil Conservation Service | 133,147,000 | 146,132,000 |
| Agricultural Marketing Service | 157,039,900 | 154,289,900 |
| Foreign Agricultural Service | 3,518,300 | 19,108,000 |
| Commodity Exchange Authority | 909,500 | 940,000 |
| Commodity Stabilization Service | 445,635,000 | 444,635,000 |
| Federal Crop Insurance Corporation | 6,376,700 | 6,376,000 |
| Rural Electrification Administration | 9,632,000 | 9,632,000 |
| Farmers Home Administration | 30,744,750 | 31,050,000 |
| Office of the General Counsel | 3,162,025 | 3,358,000 |
| Office of the Secretary | 2,881,000 | 2,899,500 |
| Office of Information | 1,431,665 | 1,488,000 |
| Library | 900,000 | 895,000 |
| Subtotal | $1,267,840,760 | $1,323,963,600 |
| Commodity Credit Corporation | | |
| Restoration of capital impairment | 1,435,424,413 | 1,226,500,000 |
| Reimbursements for special activities | 1,268,097,500 | 1,440,634,000 |
| Subtotal | 2,703,521,913 | 2,667,134,000 |
| Total | $3,971,362,673 | $3,994,097,600 |
| Loan Authorizations | | |
| Farmers Home Administration | 206,000,000 | 267,000,000 |
| Rural Electrification Administration | 215,000,000 | 310,000,000 |
| Total | 421,000,000 | 577,000,000 |

III. Supplemental Appropriations

| | *1960* | *1961* |
|---|---|---|
| First Supplemental | | |
| Agricultural Marketing Service | | $1,350,000 |
| Agricultural Research Service | | 5,200,000 |
| Forest Service | $7,500,000 | |
| Watershed protection/flood prevention | | 3,370,000 |
| Total | $7,500,000 | $9,920,000 |
| Second Supplemental | | |
| Commodity Credit Corporation | 675,000,000 | |
| Commodity Stabilization Service | 1,400,000 | |
| Foreign Agricultural Service | | 137,500 |
| Forest Service | 20,450,000 | 1,250,000 |
| Total | $696,850,000 | $1,387,500 |

this condition is the rule. Probably it would be more accurate to conclude that the Eisenhower Administration, including the Secretary of Agriculture, desired to maintain the status quo in regards to appropriations for the USDA. Congress was largely in the mood to comply with that request.

* * * * *

The main purpose of this article was to provide a general account of the farm legislation which was passed by the 86th Congress. One could hardly contend that the Congressional process is a notably neat affair. Nor could it always, or even often, be called rational, if we define the term to mean the most efficient use of limited resources to achieve specified goals. The process constitutes, to use Bertram Gross' phrase, a "legislative struggle." The interest groups—public and private—are the combatants. Certain members of Congress enter the contest either as partisans or as referees, depending on the nature of the contest.[7]

Due to the form and growth of our somewhat unique constitutional system, the committees (and subcommittees) of Congress have played an historic role which is far beyond what the written word of the United States Constitution calls for. The imperfections of the system are, however, the reflections of our social, economic and political differences. When there is a consensus of interests, the bill is enacted; when there is a balancing of strongly opposed interests, the result is often stalemate; when the situation requires that some action be taken in spite of the existing and aggressive conflicts, there are temporary enactments—reluctant decisions made in the hope of discovering a happier day in the pressing future.

[7] Nor are we, the voters, forgotten in this legislative process. There has been a tendency herein to overlook the constantly brooding consideration that a Congressional election is always in the immediate future and a Presidential campaign cannot be too far off. Politicians look to the interest groups for the creation and maintenance of the conflicts concerning policies, but the American voter cannot understand the intricacies of modern public policy. For him, politicians employ the historic techniques and speak to his beliefs, interests, traditions, and hopes.

# THE ROLE OF FARM MANAGEMENT IN UNDERDEVELOPED COUNTRIES

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IN THIS PAPER the thesis is advanced that in the economic development of primarily agricultural economies the most lucrative place to employ labor more fully and productively is right on the farms. This improvement in resource management on the farm would also step up total food production.

It is not implied that agriculture can employ productively all the underemployed labor in low-income, highly populated countries—the quantity of it is too vast. Nor would it be the thing to do from the standpoint of long run development. But in a primarily agricultural economy, agriculture is viewed as one of the essential starting points in the process of development. It is therefore argued further that the remaining excess labor, along with the additional food, can be converted into capital for general economic development. Thus farm management can contribute in several ways—by showing how labor on farms can be employed more productively, by stepping up food output, and by facilitating capital formation.

A review of the literature reveals that the importance of increasing farm labor efficiency in underdeveloped countries has been given little attention by economists. Also, the potential opportunities for expanding employment within the agricultural sector has been almost entirely overlooked. Rather, writers have considered mainly the creation of nonfarm jobs as a means of expanding employment opportunities, and they have studied the relationship of aggregate farm to nonfarm employment. While industrialization is admittedly the path that the major advanced economies have followed in their development, nevertheless the micro-aspects of utilizing more fully the underemployed cultivators and other rural people on existing farms in the newly developing countries, and the potential improvement in farm management, should be given much greater consideration.

## *Application of Farm Management*

The technical opportunities for raising farm output through dynamic farm management were not immediately apparent to me on my first visit to an underdeveloped country, Pakistan. Rather, after observing the farm-

[1] This paper grows out of the recent experiences of the author as a farm management consultant with the Food and Agriculture Organization of the United Nations, during which time he conducted seminars, and traveled in practically all of the countries in Asia and the Far East. It is also added that this paper applies largely

ing methods my initial reaction was one of utter helplessness. It seemed that there wasn't one thing in my practical experience, even that with by-gone technology—farming with horses and milking by hand—or in my training, that could be drawn upon for a helpful suggestion. The culture shock was complete.

But as I continued to visit farms, to talk with technicians, and to study research results, not only in Pakistan but in most of the other Asian countries as well, it became obvious that the growth of plants and animals in these countries is governed by the same physical and biological laws as in the United States, and that they respond very much in the same way to the ministrations of management.

At the professional level there is widespread misconception as to what farm management is. Ministers of agriculture in two of the smaller countries thought that I was to assist them in the operation of their experiment station farms. This view could be excused on the part of the ministers, but many persons in lower echelons of government supposedly concerned with agriculture at the operating level had no thought that management was needed on farms. On visits to some countries I dropped the term entirely, and dwelt instead upon the kinds of decisions and adjustments farmers need to make in order to raise their productivity, with illustrations appropriate to agriculture in the country. This approach usually stirred some interest.

In discussing the application of farm management principles on the farms with professional people at the FAO seminars, the argument at first was made that economic principles do not apply to farms in a "non-monetized" economy where most of the produce is consumed at home and little is sold for money. This is far from being true. Farmers who operate only partially in a market economy naturally do not have the same degree of external price stimuli to guide production as farmers who produce primarily to sell. But even when production is largely for home use, decisions on what and how to produce must in fact be made. The principles of comparative advantage, variable proportions, substitution, etc., since they begin with physical and biological relationships, apply just as well in the underdeveloped countries as elsewhere. Indeed they would apply in the very elementary economy of Robinson Crusoe. The only difference is that these principles must be modified to take account of differences in farmers' goals and the institutional patterns surrounding agriculture.

Another argument raised was that while management is surely needed in big, western, commercial farms, it is not needed on small farms in

to Asian countries other than Japan, whose technical achievements in agriculture are roughly three times that of the rest measured by rice yields.

underdeveloped countries. The reasoning seemed to be that farmers on small holdings merely adjust the time sequence of planting and harvesting operations to the weather, since the kind of crops grown and the techniques of operation are dictated by "other requirements." What these requirements are was not made clear. After many farm visits it appeared to me that they stem from tradition, custom, ritual and superstition. The cultivators' attitude was that to tamper with these things was to interfere with "natural laws." Of course clinging to old ways is incompatible with change. With progress some values are always given up, others attained, and improvement in farm management naturally requires such an exchange.

One also feels that cultivators simply do not understand the physical and biological laws which govern the growth of plants and animals. Indeed, one wonders if extension should devote fewer resources to teaching farmers *how to do things,* and more to imparting fundamental knowledge that will enable them *how to understand things.* Insecurity of the food supply is another reason why intuitively the cultivators hesitate to break the biological balance in their farming system that has been reached after centuries of trial and error. This is understandable, and it forces many farmers to strive not for the biggest but for the most certain crop.[2] This fear of inadequate food was forcefully driven home to me on a visit to one area where the villagers had depleted their rice stocks three weeks before harvest. This is common, and during this period their diet usually is supplemented by mangoes. I and several farmers, with their children trailing behind, walked through a dusty grove of mango trees, staring at the branches silhouetted against the blue sky above. This year not only was the rice gone, but the trees had set no fruit. Knowing that my own food supply was comfortably assured for the next three weeks, a feeling of compassion, augmented by the setting and the impending calamity, gripped me as never before. With life on such a tenuous basis, it is no wonder that the cultivators hesitate to adopt a new practice until they are convinced beyond a shadow of a doubt that it will assure them of a crop at least as good as they can obtain with traditional practices.

There are other obstacles to the adoption of new farm practices, but these are not elaborated upon here.

It hardly seems necessary to point out, however, that to achieve optimum allocation of resources, management decisions on small farms are just as significant as on large farms. The major difference is that decisions on small farms do not involve such large "chunks" of resources as on the

[2] This has been pointed out by other writers, for example, Herrell DeGraff, "Some Problems Involved in Transferring Technology to Underdeveloped Areas." *J. Farm Econ.,* 33: 697-705 (No. 4, Part 2), Nov., 1951.

large ones. Misallocation in situations where the food supply already hangs on a thread can have dire consequences.

### *Potential for Expanding Production Through Improved Farm Practices*

I am convinced that great opportunities exist on farms for both additional employment and production. One measure of the potential for increased output can be had by comparing the accomplishment of better farmers and of average farmers. For example, the top ten per cent of the farmers in India and Pakistan have at least seven times as high crop yields and animal production rates as the average of all farmers. By contrast, in Pennsylvania the ratio of best rates to average rates is less than two.[3] Another indication of the potential is the spread between "what is known" by farmers in an underdeveloped country, and "what is applied." While it is difficult to measure such a gap, farm planning studies in India have shown that production can be doubled by relatively simple changes in some farm practices.[4] The average marginal return was found to be four rupees for each rupee spent. In the area studied, cultivators double-cropped only a little more than half the irrigated land. This is significant. Shortage of water is the most serious obstacle to double cropping, yet available water was not profitably used by farmers because they lacked the proper knowledge that farm management specialists could supply.

In the rice monoculture area of a southeastern country, it takes 36 days of man labor for farmers to prepare one acre of upland rice seedbed. Having had experience in spading gardens, this seemed excessive to me, even for the hand tools which were used. The farmers explained that "the weeds were thick, and perhaps not as tall as an American, but as tall as we are." If there was enough moisture to support a lush weed crop, why could not a useful grain, such as wheat, be raised? This question was asked of a native agronomist and he replied that it might be a real possibility, but it just hadn't been tried. This also serves to illustrate the static nature of thinking, even on the part of technicians, which is characteristic of an underdeveloped economy, tight in the grip of tradition.

Another illustration of the effect of changing practices can be cited. Two South Vietnamese district agricultural officers applied improved practices, which have since been adopted by a few progressive farmers,

[3] For India and Pakistan the figures were derived from data in government statistical reports, and for Pennsylvania from Crop Reporting Service reports and farm management studies. These are rather crude comparisons, but satisfactory for this purpose. Any error arising from the better farmers having more productive land than the average farmers would be present in both comparisons.

[4] Daniel, E. F., "The Place of Farm Management in Planning for Increased Agricultural Production in India." Tour Report, I.C.A., April 1958.

to a typical farm located in an area of rice monoculture.[5] With the addition of fertilizer, but largely by reorganizing the cropping plan to employ land and labor more fully, the output of the farm was more than tripled.

This is not startling when one realizes the small fraction of the time that many farmers are employed in farm work. In western Uttar Pradesh, one of the most productive agricultural states in India, farmers are actually employed the equivalent of eight hours a day for only six months of the year.[6] In Thailand, which is one of the leading rice producers, a study of one area showed that farm workers are employed only 100 days of the year.[7] On small farms it may be as low as 60 days. Part of the reason for this is that during the monsoon season some lowland areas are flooded. On such land rice is growing during the period, and the opportunity for other activity on the farm naturally is limited. Then follows the "dry" season. Despite a deficiency of moisture on unirrigated land during this period, it often is possible to follow rice with other grain crops and vegetables which demand less water, and of course this is always possible in irrigated areas. Since this would lengthen the period of cropping, more intensive use of the land could be made, and far more employment could be provided. In one area of the Philippines where both single and double cropping of rice is practiced, labor utilization on double-cropped farms is over twice that on single-cropped farms.[8]

Some persons might question whether new food crops from diversified rotations would be accepted by the people because of traditional food consumption patterns. To me this appears to be a relatively small problem. One is impressed with the wide variety of diets in different, often adjoining, regions of these countries. This demonstrates considerable adaptability on the part of the people to adjust their diets to the particular foods which can be grown. Even in a rice area I feel certain that the people would be glad to have other crops to supplement their meagre diets if such crops were available through diversification of rotations.

Many additional illustrations could be given to show that relatively simple changes in farm organization and production techniques can be used to increase output. Some of these changes require only greater inputs of labor with no concomitant changes in capital inputs. In other cases, additional inputs of extra factors will be required, such as seeds, tools, water and fertilizer.

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[5] Pham-Van-Nhu and Hoang-Manh-Khue, unpub. mimeo. presented at FAO Seminar on Farm Management, Saigon, Viet-Nam, Oct.-Nov. 1958.

[6] Agrawal, G. D., and C. P. Shastri, *Studies in Economics of Farm Management in U.P.*, Ministry of Food and Agriculture, Gov't of India, New Delhi. 1956.

[7] *Thailand Economic Farm Survey*, Ministry of Agriculture, Gov't of Thailand, Bangkok, 1953.

[8] DeGuzman, L. P., H. von Oppenfeld, and E. V. Quintana, "The Effect of Management on Incomes of Rice Farmers," *The Philippine Agriculturist*, Vol. XLII, No. 5, Oct. 1958.

Due to the scarcity of land relative to the population and the present techniques used, most of the countries are a long way from any substantial type of livestock agriculture. However, the need to produce economical calories through grain is not present in all countries. For example, in Burma vast areas of fertile land are not used.[9] In such countries the addition of livestock would open up enormous opportunities for alleviating the seasonal character of production, and for improving the efficiency in resource use, including labor. Here farm management men could assist by working out crop and livestock systems for pilot farms, and later for groups of settlers.

### *Food and Labor for Capital Formation*

It has been shown that farmers in the Asian countries are greatly underemployed. Indeed a great number of people are almost totally unemployed. This is also true of most other countries which are underdeveloped and overpopulated. This pool of unutilized labor is one of the major indigenous resources. And not unrelated is the fact that capital is as scarce as labor is abundant. Since great quantities of capital are needed in development, it is desirable to find ways of converting labor into capital.

Nurkse[10] says that disguised unemployment contains a hidden source of saving available for such capital formation. What is wanted is that farmers who remain on the land continue to feed those who are shifted to work on capital projects. Since the underemployed workers depend upon the farmers for subsistence regardless of where they are, they can just as well be working on construction. There are three leaks in the system, according to Nurkse.

First, there is the possibility that any increase in farm production will be consumed by the underfed farm people who raise the food, and that it will not be available for those who leave the land. In this case no saving is available for capital formation. I would add that this is most likely to be true if yearly increases in production are very small, and if the farm population increases in numbers. If substantial improvement can be made in a short time, and technically this is possible, then there would be some excess above the needs of the farmers, making savings possible. The strong propensity to consume, both for farm and non-farm products, however, may have to be held in check, at least in the short run.

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[9] *Farm Management Notes for Asia and the Far East,* No. 6, Regional Office, FAO, Bangkok, Thailand, June 1960. In the Shan States the total arable land is estimated at 5.7 million acres, of which only 1.7 million are under cultivation. Only 2 million persons live in this area. East Pakistan, with smaller area and similar physical and climatic conditions, supports 45 million persons.

[10] Nurkse, Ragnar, *Problems of Capital Formation in Underdeveloped Countries.* Blackwell, 1953.

The second problem, according to Nurkse, is that a person transferred to construction work probably will require more calories per day than when he is an underemployed farm laborer, and this will bring about a net food deficit. The third is the cost of transporting the food. Nurkse suggests that outside funds could be used to make up for these three leakages. Such funds would have considerable multiplier effect by putting much greater resources to work.

In my opinion the large potential for increasing farm production through the adoption of better farm management practices would be more than adequate to cover the leaks mentioned by Nurkse. Not only that, but agriculture has the biggest single pool of labor. Because the marginal productivity of a great number of workers is zero, it should be possible to remove them from agriculture without decreasing total farm production. Indeed, with fewer workers in agriculture, the remaining farmers would be stimulated to improve their own labor efficiency, thus adding more to the savings potential. Agriculture, with its pool of excess labor, and potential for expansion in aggregate output through greater productivity, contains to a large extent the self-generating factors for economic development in the early stages. What is needed is to employ those who leave the farms in capital producing activities, and at the same time provide them with the food that increased farm productivity makes possible. Such conversion would create capital from resources within the country, from whence most capital will need to come in any long-run program of economic development.

### *Present Status of Farm Management in Asian Countries*

Of all the countries in Asia, farm management in Japan probably is the most advanced, both in its contribution to agriculture, and in recognition of it as a profession. There, much research is being carried out both in the government and at the universities.[11] In extension, persons at the national and prefecture level are assigned to work in farm management, and they are identified as such.

India is making rapid strides in developing farm management. Under the aggressive leadership of the Directorate of Economics and Statistics, Ministry of Food and Agriculture, a series of much needed farm management studies have been completed,[12] and farm planning projects have

[11] See, for example, Juichi Sato, "Dairy Enterprise Combined with Agriculture in Japan," unnumbered mimeo., 53 pp., Ministry of Agriculture and Forestry, Tokyo, Oct., 1957; and Masso Otsuki, "Conceptions of Farm Size and Intensity of Farming," *Memoirs of the College of Agriculture*, Kyoto Univ., No. 77, Feb. 1958. (Only a few Japanese publications appear in English.)

[12] Agrawal, G. D., and C. P. Shastri, *op. cit.* In this same series are five other excellent farm management studies, by various authors, for the following areas: Bombay, Madras, Punjab, West Bengal and Madhya Pradesh.

been instituted for most of the states. The Directorate has numerous well-trained agricultural economists. Many of the agricultural colleges have economists on their staffs, in both teaching and research.

The Philippines, Nationalist China, Thailand, and Pakistan have small beginnings in agricultural economics, but for the rest of the countries we can say that recognition of agricultural economics, and especially farm management, is practically nil. In these countries, farm management is at the stage where some production people are beginning to think about it, as was the case in this country 40 years ago. Multilateral, bilateral, and various foundation aid programs have been influential in developing agricultural economics in the region. Notable among foundations are the Ford Foundation and The Council on Economic and Cultural Affairs, Inc., which devotes practically all of its effort to this end.

So far the bulk of the research has been done in Japan and India, with one or more studies having been completed in the Philippines, Thailand, Nationalist China, Pakistan, and Malaya. This is an excellent beginning, considering that practically all of it has taken place since World War II.

### *Ways in Which Agricultural Economists Can Contribute*

Agricultural economists have unusual opportunities for aiding in the development of agriculture in underdeveloped countries. For example, improvement programs invariably include special intensive projects that call for radical reorganization of the production resources, such as land reclamation and settlement, irrigation, and consolidation of fragmented holdings. Farm management research and extension personnel have much to contribute in the planning and carrying out of the type of programs named above, yet they seldom have been included. Some projects, even those proposed and undertaken with outside technical assistance, have shown lack of foresight when it comes to implementing these programs on the land. In land settlement not enough attention has been paid to determining farm size, crops to be raised and labor utilization. Settlers left to their own trial and error systems naturally start out with the familiar crops they previously raised, but these often are completely unadapted to the new environment. Food production has been disappointing. This has resulted in the need for continued subsidization by the government, rather than the increased output and relief from government handouts which were sought.

Lack of planning for efficient use of water on farms has been especially evident in irrigation projects. While there have been problems in engineering, in most cases these eventually have been solved successfully. What often has been overlooked is provision for showing farmers how to reorganize their farms from a dryland system to one under irrigation. With water available, farmers often have continued to use dryland tech-

niques. This has resulted in only fractional yield increases for irrigation farming over dryland farming. In addition, only a small part of the land brought under irrigation is cropped more than once. For example, a Ford Foundation report states that "India now gets only one-fifth to one-fourth ton increase in crop yields on irrigated lands as compared to non-irrigated lands. Moreover, only about 12 per cent of irrigated acreage grows more than one irrigated crop per year."[13]

It is clear that investment in projects without planning for the successful implementation of practices on the land is a waste of resources.

The contribution of any profession ultimately rests on the research results that support it, and of course this applies to farm management. Rapid strides have been made in Japan and India in farm management research. But the researchers recognize that there is considerable room for improving the type of research so that the results will be more useful in farm management recommendations. Almost all the studies completed have been based on large scale farm surveys, which have gathered general information useful in overall planning. Since fundamental farm management relationships have not been explored, the findings can not be applied to the solution of practical problems at the farm level. Considering the great paucity of descriptive data on agriculture, it is easy to understand why the first farm management studies have been aimed toward finding "what is out there." One advantage of such studies is that they often reveal problems on which more specific information is needed. But because of the small number of farm management workers, resources devoted to costly gathering of census-type data must be carefully limited. The latter type of data should be gathered by other departments of government, with farm management men available for advice as necessary. The real danger, which already is apparent, is that the field of farm management will become identified as a professional group of "census-takers." This kind of activity is far from the real core of farm management, and in a region where first impressions are now being made, it is essential that research be directed so that the greatest potential contribution of farm management can be emphasized.

At this stage of development in the profession, more projects with a problem-solving orientation are needed—projects that provide extension workers with data and information which they can use to help cultivators solve production problems on their farms. High on the list should be those studies that help farmers to reorganize their production resources. Included would be input-output studies of specific farm operations. An example is one on the threshing of wheat, which now takes about eight

[13] *Report on India's Food Crisis and Steps to Meet It* by the Agricultural Production Team headed by Sherman E. Johnson and sponsored by the Ford Foundation, Govt. of India, April 1959, p. 5.

days of man labor plus bullock power for each acre of grain. Present methods sap the strength of both man and beast, and preparation of the ground for the next crop is delayed. It is also a time of peak demand for labor, and requires workers in agriculture who are largely idle the rest of the time, thus adding to the problem of underemployment. The problem here is partly technical, and partly it is a matter of work organization. Farm management men and agricultural engineers should cooperate on this. Other research could be directed to finding more rational methods of distributing water among the various crops, and more suitable cropping plans, especially those that extend the cropping period. These are only a few suggestions. The projects should be oriented toward greater efficiency in the use of resources, *especially labor*. A knowledge of basic production functions on the farm, along with other micro data, will assist not only in making sound changes in the practices of cultivators, but such data are essential for state and national planning agencies as well.

### *Conclusion*

Many elements active in economic development have been advanced by writers, attempting to find ways of breaking the vicious circle of low productivity, low income, little savings, and little investment. Most treatment of the subject has been at the macro level. In this paper the potential contribution of farm management is advanced. It is shown that lucrative opportunities for raising productivity and employing labor more fruitfully exist right on the farms. This has often been overlooked. Furthermore, in primarily agricultural economies self-generating factors for development need to be sought in agriculture just as vigorously as they are being sought in the industrial sector. Agriculture contains the biggest single pool of labor, with a great deal of underemployment. If food production can be raised, and technically and economically it is possible, the additional food can be combined with excess labor, and both converted to the task of capital formation. To do this it is necessary to improve the use of farm resources, including farm labor. This is where farm management, in both research and extension, can make a great contribution to economic development.

# TITLE TO LAND

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OWNERSHIP is recognized as a major phase of land tenure, a subject to which agricultural economists have devoted much time and effort. Yet our knowledge of how people actually hold title to land is limited.

The way title is held is important both to the owner and to his family. The title largely defines his rights in the land. Wunderlich states that "the way in which land is held and the persons by whom land is owned can affect significantly the distribution and production of wealth."[1]

There is much literature in law journals to suggest strongly that in many states there are shifts in the way title is held.[2] On the other hand, there is virtually nothing in agricultural literature on these changes. An unpublished report on one township in Pennsylvania states that in 1880 no property was owned by husband and wife, but that in 1946, 50 percent of the ownership units were owned by husband and wife as tenants-by-the-entirety.[3] Our lack of knowledge on how title is held and on what changes are occurring indicate a need for additional basic research in land ownership.

## *Changes in Ownership in a Virginia County*

A recent study in Augusta County, Virginia reveals significant changes from 1930 to 1957 in the way title is held. These changes may give an insight of what is occurring elsewhere. In this study, the pattern of ownership as it existed in 1957 was determined for 73,500 acres of the 357,000 acres in the agricultural area of the county. The ownership of the *identical* land area was traced back to 1930.

A major change was the decrease in the number of units owned by individuals as sole owners. For both periods, the individual was the most important type of owner in terms of either number of ownership units or amount of land owned. In 1930, titles to more than two-thirds of the

* The author wishes to acknowledge the helpful comments received from discussing this subject with W. L. Gibson, Jr., of Virginia Polytechnic Institute and with Emerson G. Spies of the University of Virginia.

[1] *Land Ownership in the Great Plains*, U.S. Agr. Res. Serv., ARS 43-93, June 1959.

[2] For example, an editor's note to an article in the *Trust Bulletin* in November 1945 refers to "the marked increase in joint ownership in 31 of the 49 states during the past 10 years."

[3] Walrath, Arthur J., *Analysis of Methods of Acquiring Farm Ownership*, unpub. rept., Bu. Agr. Econ., USDA, Jan. 1947.

TABLE 1. TYPES OF OWNERS, AUGUSTA COUNTY, VIRGINIA, 1930 AND 1957

| Type of Owner | 1930 Units | | 1957 Units | |
|---|---|---|---|---|
| | *Number* | *Percent* | *Number* | *Percent* |
| Sole Owners | | | | |
| Man | 286 | 56.6 | 197 | 37.9 |
| Woman | 58 | 11.5 | 52 | 10.0 |
| Total | 344 | 68.1 | 249 | 47.9 |
| Husband and wife | | | | |
| Without survivorship | 45 | 8.9 | 48 | 9.2 |
| With survivorship | 1 | 0.2 | 129 | 24.8 |
| Total | 46 | 9.1 | 177 | 34.0 |
| Other co-owners[1] | 34 | 6.7 | 34 | 6.5 |
| All others[2] | 81 | 16.1 | 60 | 11.6 |
| Total | 505 | 100 | 520 | 100 |

[1] Only those with equal interest but not including husband and wife units.
[2] Including life estates, unsettled estates, corporations, and miscellaneous classifications.

ownership units of 3 acres or more were in the names of sole owners, but in 1957 less than half (see Table 1).

Within sole ownerships there was a shift in the proportions held by men and by women. In 1930, 83 percent of the sole ownerships were owned by men and 17 percent by women. By 1957, these proportions had changed to 79 and 21 percent respectively. (Because of the decrease in the number of sole ownerships over this period, the number of units owned by women as sole owners decreased from 11.5 to 10 percent of all ownership units.) The marital status of these sole owners was not determined, although this would be important in an ownership study, at least in Virginia and other states in which dower and curtesy rights exist.

Offsetting this decrease in the number of sole ownership units was a marked increase in the proportion of units owned by husband and wife, from 9.1 percent in 1930 to 34 percent in 1957. Again within this group there was a significant change in the way title was held. Husband and wife owned 46 property units in 1930, but only one of these was held by husband and wife with the right of survivorship.[4] (In this case, the joint

[4] No distinction was made between joint tenancy or tenancy-by-the-entirety, but in an ownership study such distinction should be made. It might be added that the 1930 case was actually a joint tenancy, and that in 1958 the property was held by the surviving widow.

In the other 45 ownership units, husband and wife held the property as tenants-in-common with each spouse having an undivided half interest in the land. This meant that when one person died, an undivided half interest became a part of the deceased person's estate. If there was no will and the deceased was survived by minor children, a complicated situation could arise. If the surviving spouse is as-

tenancy had been created by will.) In 1957, of the 177 units owned by husband and wife, 129 were held with the right of survivorship.[5]

Four significant changes, then, have occurred since 1930. First, although the sole owner is still the most important type of owner, his relative position has been greatly reduced. Second, the importance of women as sole owners has increased as compared with men as sole owners. Third, the number of units owned by husband and wife as co-owners has increased greatly. Fourth, joint tenancy with right of survivorship (or tenancy-by-the-entirety) is rapidly replacing tenancy-in-common for husband and wife ownerships.

What has occurred in Augusta County is similar to what has been taking place elsewhere in the state as well as elsewhere in the country. This raises several questions—why have these changes taken place? What are the future implications of these changes?

### *Reasons for These Changes*

Several different courses were taken in an attempt to find an explanation as to why these changes have been taking place. So far no completely satisfactory explanation has been found, but hypotheses are presented.

One line of exploration taken involved examination of various published materials, such as "law books" for farmers, textbooks that might include materials on ownership, research and extension publications involving ownership, and published articles that might conceivably include some mention of co-ownership and that might be read by owners of farmland, by researchers interested in this field, or by lawyers. A change comparable to the changes in ownership of lands in Augusta County is found in these publications.

It is only in recent years that recognition has been given in such publications to the fact that property may be owned by two or more persons. For example, early "law books"[6] for farmers frequently have sections on

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signed dower (or curtesy), it could become even more complicated with the future disposition of the dower land.

[5] Although most of these would appear to the layman to be joint tenancies, which can be destroyed by either party, there is a strong presumption that most are tenancies-by-the-entirety, which cannot be destroyed by the action of either party acting individually. *In Burroughs v. Gorman* (166 Va. 58), property conveyed to husband and wife "as joint tenants with common-law right of survivorship" was held to be a tenancy-by-the-entirety. Ritchie, in "Tenancies by the Entirety in Real Property" (Virginia Law Review, March, 1942), states that a joint tenancy between husband and wife cannot be created in Virginia.

[6] Examples of "law books" for farmers that include no discussion on co-ownerships are:

Adams, R. L. and Bedford, W. W., *Everyday Farm Laws,* The Interstate Printers and Publishers, Danville, Ill., 1949.

deeds, mortgages, and so on, but usually there is no reference as to how a person or persons may hold title to the land. Some of the more recent books[7] have sections devoted to various types of co-ownerships—tenancy-by-the-entirety, joint tenancy, and tenancy-in-common, as well as community property.

This is also true for textbooks,[8] which range from no recognition of co-ownership to a fairly complete discussion of different types of co-ownerships.

The same change can be seen in research and extension publications.[9] Since 1947, many states have published bulletins on inheritance or father and son agreements, and many of these bulletins include a section on how title to property may be held. However, studies involving land ownership *per se* contain few data on co-ownerships. For example, the recent

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Corey, Henry B., *The American Agriculturalist Law Book,* American Agriculturalist, New York, 1886.

Green, John B., *Law for the American Farmer,* The Macmillan Co., New York, 1911.

[7] Two recent books with fairly detailed information on co-ownerships are:

Beuscher, Jacob H., *Law and the Farmer,* Springer Publishing Co., New York, 1953.

Hannah, Harold W., *Law on the Farm,* The Macmillan Co., New York, 1948.

[8] The first of this group of books is the only one to include discussion of co-ownerships:

Barlowe, Raleigh, *Land Resource Economics,* Prentice Hall, Englewood Cliffs, N.J., 1958.

Ely, Richard T., and Wehrwein, George S., *Land Economics,* The Macmillan Co., New York, 1940.

Renne, Roland R., *Land Economics,* Harper and Brothers, New York, 1947.

Salter, Leonard A., Jr., *A Critical Review of Research in Land Economics,* Univ. of Minn. Press, Minneapolis, 1948.

[9] Following are only a few of the Experiment Station and Extension Service bulletins that refer to different types of co-ownerships:

Beuscher, J. H. and Young, Louise A., *Your Property—Plan its Transfer,* Wis. Ext. Serv., Circ. 407, 1951.

Ellis, Harold, Barlowe, Raleigh, and Hill, E. B., *Inheritance of Farm Property in Michigan,* Mich. Agr. Expt. Sta., Spec. Bul. 388, 1953.

Evans, Orrin B., *Legal Safeguards in Buying a Farm,* Mo. Agr. Ext. Serv., Circ. 527, June 1946.

Hannah, H. W., "Procedures Ordinarily Involved in Buying a Farm," *Illinois Farm Economics,* Nos. 138-139, Nov.-Dec. 1946.

Hannah, H. W., *Law for the Illinois Farmer,* Ill. Ext. Serv., Circ. 632, 1948.

Harris, Marshall, and Hill, Elton B., *Family Farm—Transfers,* Ill. Ext. Serv., Circ. 680, 1951.

Hill, Elton B., *Father and Son Farm Partnerships,* Mich. Agr. Expt. Sta., Spec. Bul. 330, 1944.

Krausz, N. G. P., and Marti, F. D., *Illinois Inheritance Laws, Wills, and Joint Tenancy,* Ill. Ext. Serv., Circ. 747, 1955.

Walrath, Arthur J., and Gibson, W. L., Jr., *What Will Become of Your Farm?* Va. Ext. Serv., Bul. 169, 1947.

Walrath, Arthur J., and Gibson, W. L., Jr., *Farm Inheritance and Settlement of Estates,* Va. Agr. Expt. Sta., Bul. 413, 1948.

Some of these publications have been revised since the original date of publication.

study, *Land Ownership in the Great Plains*,[10] recognizes that the way land is owned is important, but apparently makes no distinction between (1) units owned by a husband, (2) units owned by a wife, and (3) units owned in various ways by both husband and wife. As research workers, we have not altered our thinking in line with the changes that have occurred, although writers of "law books" for farmers and writers of textbooks have made the change.

Articles listed either in the *Agricultural Index* or the *Index to Current Periodicals* were examined if it appeared that a particular one might reasonably include some mention of co-ownerships. The magazines examined were ones that could conceivably be available to farm owners.

The situation found here is merely a replica of the previous situations. Some articles go into considerable detail as to the steps involved in obtaining title to property, but frequently there is no mention that title may be held by husband and wife.[11] The earliest reference to co-ownerships was a brief sentence by Beatty in 1937 that certain properties are held jointly by husband and wife and do not become a part of the deceased person's estate. In the late 1940's, the number of articles that included references to co-ownership increased greatly.[12] Some of these have fairly complete discussions of the ways in which husband and wife can hold title to land.

Landowners in general do not read the professional publications of lawyers and agricultural economists. For many years, the tenancy aspect of farm tenure was emphasized. One of the earliest articles concerned with the ownership aspects of tenure was by H. W. Hannah in the *Journal of Farm Economics* in 1941. This article does not report on a research study but it does present suggestions on how title to land should be held by families in various circumstances. As early as 1941 the author recognized that the way title is held is important to the welfare of the family. He wrote:

> Members of land-owning farm families are affected by the way land is owned. Oftentimes the ability of a family to remain intact and continue a wise

[10] *Op. cit.*

[11] For example see:
Kelly, Howard C., "Get a Lawyer," *House and Garden*, June 1943.
Cramp, Ralph E., "Legal Aspects of Home Buying," *House and Garden*, Feb. 1941 suppl.

[12] Some of these articles are:
Beatty, Jerome, "A Will of Your Own," *Reader's Digest*, Feb. 1937.
Berry, Russell L., "The Rightful Heir," *The Farm Quarterly*, Summer 1950.
Churchill, Maxine, "Deeds and Misdeeds," *The American Home*, March 1947.
Downing, E. D., "Who Owns Your Home?" *Better Homes and Gardens*, March 1948.
Evans, Wainwright, "Why and How to Make Your Will," *Better Homes and Gardens*, Feb. 1944.
Rosenberg, Charles R., "Put it in Both Names," *The American Home*, April 1943.

use and management of land after the termination of a present ownership depends upon the kind and quality of interest possessed by the member or members of the family holding title. . . .[13]

The *Index to Legal Periodicals* was examined for the period from January 1, 1926 through 1958 for articles in which co-ownerships might be discussed. Many of the earlier articles examined were concerned primarily with the legal technicalities of different types of co-ownerships. Starting in the 1940's, many authors recognized that there was an increased use of joint tenancies.[14] At the same time, considerable concern was being expressed about the disadvantages that could arise under certain conditions with the use of joint tenancies. Some authors discussed both the advantages and disadvantages that might come about, although emphasis was on the latter.[15]

This still does not explain why these changes in ownership have occurred. It will be recalled that the greatest changes have taken place since 1942, but the two "law books" for farmers were published after 1949, while the bulletins on inheritance and father and son agreements were published mainly after 1947. Evidently their writers recognized that these changes were taking place at that time.

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[13] Hannah, H. W., "Family Interest in the Ownership of Farmland," *J. Farm Econ.*, p. 895 ff., Nov. 1941.

[14] For example:

Mann, John, "Joint Tenancies Today," *University of Illinois Law Forum*, Spring 1956.

Moodie, Robert R., "Some of the Dangers of Joint Tenancies," *Nebraska Law Review*, Jan. 1950.

Rhes, H. Cornelius, "Dangers of Joint Tenancy," *Title News*, Sept. 1951.

Spies, Emerson G., "Title to the Family Dwelling: Some Neglected Considerations," *Virginia Law Review*, Feb. 1954.

Stephenson, Gilbert T., "Joint Ownership of Property with Right of Survivorship," *Trust Bulletin*, Sept. 1945.

Weidert, Richard J., "The Legal and Tax Phases Involved in Joint Ownership of Property," *Trust Bulletin*, Nov. 1945.

Ritchie, John, 3rd, "Tenancies by the Entirety in Real Property with Particular Reference to the Law in Virginia," *Virginia Law Review*, March 1942.

[15] In addition to the articles cited in the previous footnote, the following are representative of this type of analysis:

Blumberg, Henry, "Popular Estate Delusions," *Trusts and Estates*, June 1951.

Gathright, Joseph R., "Disadvantages of Joint Ownership," *Trust Bulletin*, June 1951.

Knecht, Lawrence G., "Joint Ownership Reappraised," *Trusts and Estates*, July 1949.

Marshall, Arthur K., "Joint Tenancy, Taxwise or Otherwise," *California Law Review*, Winter 1952-53.

Niles, Russell D., "Abolish Tenancy by the Entirety," *Trusts and Estates*, Oct. 1944.

Ritter, Paul, "A Criticism of the Estate by the Entirety," *University of Florida Law Review*, Summer 1952.

Ryland, Robert A., "Tenancy by the Entirety in Virginia," *Virginia Law Review*, April, 1938.

It has been suggested that the changes in the way title is held must be attributed primarly to local custom. Professor Emerson G. Spies, of the University of Virginia School of Law, points out that the custom varies widely from area to area within Virginia. He mentions that in some areas certain things are the "customary thing to do." For example, it was customary in one county to convey land to husband and wife for "their joint lives with remainder in fee simple to the survivor."[16] The fact that this was customary might be attributed to the influence of one or more lawyers who started to use this phrase.

In this same county, it has become more customary in recent years to use the phrase "as tenants-by-the-entirety with full rights of survivorship as at common law and not as tenants-in-common." Again, this phrase became customary because of the influence of lawyers. This suggests that lawyers have been primarily responsible for the changes in the way title to land is held. Land purchasers who have not sought legal advice tend to follow the customary practice.

The changes must be related also to the changing position of women in our economy. Woman's position has improved greatly in a relatively short span of years. Prior to the last generation or two, a married woman's relationship to property might have been expressed by her husband as "What is yours is mine and what is mine is my own." In many respects, the wife has now attained more or less equal status with her husband so far as property rights are concerned. The changes made in the way title is held are in line with the overall changes in the relative position of married women in our economy.

### *Future Implications of These Changes*

The changes in the way title is held can affect future ownership or use of the land. It is assumed that an increasing percentage of the ownership units will be held by husband and wife with right of survivorship.[17] Under this assumption, what changes can we expect over the next decade or so?

An increase in the number of units owned by husband and wife will come about largely at the expense of the number of units owned by sole owners. However, a longer term effect will bring about a reversal of this trend. That is, some units that had previously been owned by husband and wife will become sole ownership units as a result of survivorship.

It is a well established fact that wives normally outlive their husbands. This means that over a period of time, the number of or percent of units

[16] For a discussion of problems of interpretation of this localism, see Professor Spies' article, "Some Consideration in Conveying to Husband and Wife," *Virginia Law Review*, May 1948.

[17] Tax considerations, however, can slow or reverse this trend.

owned by husband and wife with right of survivorship will reach a peak and then decline slightly as properties are acquired by widows as a result of survivorship.

Legally, the survivor acquires title not at the death of his or her co-tenant but at the time title passed to husband and wife. With an increased use of joint tenancies, we can expect a lengthening of the period of ownership. When property is owned solely by the husband, ownership ceases at the time of his death. With properties held by husband and wife, ownership extends beyond the husband's death, thereby increasing the length of the ownership period.

The increase in the number of joint tenancies will also bring about a change in the characteristics of estates of deceased persons. When the title to land was held by the husband, the land became a part of his estate. Normally, the wife's estate did not include land unless it has been willed to her by her predeceased husband or by her parents. With fewer units owned by the husband and more owned by husband and wife jointly, the land will not be part of the estate of the deceased husband but might eventually become a part of the estate of the deceased widow.

The number of life estates created will also be affected. With land held in joint tenancy, the husband cannot convey a life estate in the land to his surviving wife. She has the land upon his death as the survivor regardless of what his will provides. Likewise, the number of widows who will claim dower will decrease.

It seems reasonable that land use also will be affected. If title was held by the husband, a certain amount of uncertainty affects the use of the land during the period his estate is being settled. On the other hand, if title was held jointly, the survivor in her own right can enter into agreement with other parties regarding the use of the land. The uncertainty as to future use or even ownership is removed as there is an owner who can decide what to do.

One point that is uncertain at present is the use to which widows will put the land. It is assumed that a widow who is a sole owner will act differently from a widow who has only a lifetime interest in the land (or an informal agreement to use the land for her lifetime). As a life tenant, the widow has certain alternatives she can elect. She can operate the land herself; she can rent the land to someone else; or she can let the land lie idle. It is possible that the latter is not a choice but a course into which she is forced with the passing of years.

On the other hand, the widow as holder of fee simple title has many additional rights. Her rights are the same as any other owner's. She can use the land as she desires. However, her ability to use the land efficiently will probably depend partly upon the disposition of the personal farm property of her deceased husband. She can convey all or a

part of the land to another party, and the conveyance can be a gift or a sale. If she does not dispose of the land during her lifetime, she can devise it by will. Otherwise, it will be distributed to her heirs according to the law of descent. Also, as the owner, she can use the land as security in obtaining funds. As widows find themselves either unable to operate the farm or to obtain someone to operate all or parts of it, they will be more likely to sell out than to keep the land and allow it to run down.

One important question that has not been discussed is whether the increased use of husband and wife co-ownerships will result in adjustments in the size of ownership units. It is assumed that the adjustments that are made during their joint lives will not vary because of the way title is held. It is also assumed that if there are any adjustments, they will come about after the death of one spouse, usually the husband. The hypothesis is proposed that with an increased use of joint tenancies, adjustments in size of ownership units will be delayed for at least a short time.

In Virginia, a surviving wife acquires all land[18] owned by her deceased husband under two conditions: (1) If he dies intestate and is not survived by any children or their heirs, and (2) if he devises all the land to his wife in fee simple. To the extent that these situations exist, the adjustments made will be similar to those made if the wife acquires full ownership as a result of survivorship.

Under other situations when title is held solely by the husband, various possibilities for adjustments in size arise upon his death. If he dies intestate, his heirs or the court may bring about a partition of his lands. If he dies testate, he may have devised parts of his land to various persons. With title held jointly, the death of the husband will not bring about these changes in the size of the ownership unit.

Adjustments in size of ownership units can be made after the widow becomes sole owner through survivorship. As owner in fee simple, she has considerable freedom in what she does with the land. Although our knowledge of this type of ownership unit is limited, one hypothesis is proposed. As widows become sole owners, more opportunities will arise for other farm operators to enlarge their units. If the widow fails to acquire adequate personal farm property on the settlement of her husband's estate, she might be encouraged to reduce her real estate holdings rather quickly. Nearby operators who are aware of the situation will be in position to purchase tracts as widows need additional funds. What takes place will be a shift in the time when adjustments in the

[18] If debts of the estate are in excess of the value of the personal property, some of the land might be sold to provide means for paying off these debts.

size of ownership units occur. If title was held solely by the husband, any adjustments in size took place in the settlement of his estate. With title held jointly by husband and wife, any adjustments will be made during the period the widow holds title as the sole owner and will be completed, if she still owns land, with the settlement of her estate.

A son who has been operating the farm with his father may find himself in a more precarious position upon his father's death if the land had been owned jointly by his parents than if his father had been sole owner. As sole owner, the father could have prepared a will in which the farm was conveyed to the son under certain conditions. If instead the land is held jointly, the father cannot devise the land to his son if he predeceases his wife. Likewise, the widow can prepare a will, but situations could arise that would encourage her to change her intentions. For example, if she remarried, she might take steps to provide for her second husband to the disadvantage of her son.

## *Epilogue*

Lawyers have recognized that changes similar to those made in Augusta County have been taking place in many states. In many cases, they have expressed concern about these changes either because of the legal problems that might arise or because of various tax angles. Agricultural economists, however, have not been concerned with them, although some have recognized that the way title to land is held is of importance to the welfare of the family.

Basic research is needed to provide us with information on how title to land is held and on what changes are occurring. Only then can we develop a better understanding of what is likely to take place as land passes from one generation to the next.

# THE ECONOMIC SIGNIFICANCE OF WOODLAND RECLAMATION BY BRITISH FARMS

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FROM the beginning of the Second World War in 1939 until about the mid-1950's, British farming was charged with the responsibility of increasing home food production practically regardless of cost. In the first instance this was because of the difficulty of importing foodstuffs under wartime conditions but, at the end of the war, agriculture's task remained substantially the same because of the difficult balance of payments situation in which Britain then found herself. To help farmers in fulfilling their allocated role in the national economy, the government, in accordance with the terms of wartime legislation and the postwar Agriculture Act of 1947, offered unprecedented advisory and financial aid towards the reclamation of marginal land, the improvement of potentially good farmland neglected during 70 years of agricultural depression, and the survival of small, isolated, and ill-equipped farm units.

From a purely agricultural economic viewpoint, a great deal of the effort along these lines would not stand up to close examination. Yet, on reflection, there can be little doubt that it was an invaluable part of the overall socio/politico/economic policy of the nation. Only from the mid-fifties onward did it become apparent that the national and international situations had changed in such a way as to make a major reassessment of domestic agricultural policy desirable. By this time imported foodstuffs were again available, and Britain was more nearly in a position where she could pay for what she needed—particularly if her currency-earning manufacturing industries could be freed from the economic handicap of subsidizing home agriculture.

But, whilst Britain's trading position had greatly improved, it was still far from being as secure as in the pre-war years. The international balance of payments situation was, and promised to remain, delicately balanced and largely dependent on favourable terms of trade. Agriculture, therefore, still had a vital role to play in the national economy. Some subsidization was certainly still justifiable in the interests of maintaining the industry as a valuable makeweight in the business of balancing the national account midst the vagaries of world trade. But the subsidies had to be strictly limited if they were not to become a burden on the export industries, and this idea became the keynote of the Agriculture Act of 1957. By the provisions of that act, advisory aid and financial assistance were to be directed towards the establishment of a strong and flexible agricultural industry—farms were to be developed into viable economic units, and grant aid, for the first time, except in a

few specific schemes, was to be invested in work which would ultimately show a positive financial return.

During the years whilst Britain has been planning a national economic role for agriculture, she has also been committed to a policy of social planning which, amongst other actions, has involved the improvement of living conditions in the more isolated rural areas. This, inevitably, has meant subsidization of the local agriculture, and provision for its continuance was included in the Agriculture Act of 1957. We shall see that investment in this field is not particularly attractive from an economic viewpoint and, thereby, not in keeping with the spirit of the 1957 Act. It may well be justifiable from a social viewpoint, but if its purpose has been primarily social, this point has never been made clear—with the unfortunate result of confusing many economic appraisals of the agricultural policy.

### *The Food Replacement Problem*

Through the years whilst farmers were struggling to increase home food production, and for the whole period in which they have been faced with the task of improving their economic efficiency, they have been working with an ever diminishing area of cultivated land. The decline in the agricultural acreage has been due to the very considerable increases in the national urban and industrial areas. The severity of the loss to agriculture is difficult to assess because of the inadequacies of the land-use recording machinery. But it would appear that, between 1939 and 1954, the total area of agricultural land declined by some 817,000 acres, and that additional losses up to the year 1970 can be expected to fall between a lower limit of 500,000 and a maximum figure of about 700,000 acres.[1] Whilst there must remain some doubt about actual acreage figures, we can be much more certain that agricultural land losses (past and future) have involved, and will continue to involve, land of much more than average quality.

For many years the continued decline in agricultural acreage has been a matter of grave concern in Britain. In practice, it has always been evident to many agriculturalists that the loss of food production due to declining acreage was being (and could continue to be) countered by increased output from surviving farms. But this argument, quite logically, carried little weight as long as the country was committed to a policy of maximum food production. After 1957, however, the argument required more careful consideration, for agriculture's new task became the maintenance of output at approximately the level of that year. With constant pressure on its land resource, and profitable farming becoming more difficult every year, even this task was not likely to be easy. Above

[1] Wibberley, G. P., *Agriculture and Urban Growth*, Michael Joseph, London, 1959.

all, it would require a high level of investment—much of which was to come from the public purse and which, to accord with the new agricultural policy, would have to be distributed in such a manner as to permit a gradual reduction in the overall figure for agricultural subsidization. The national problem, therefore, was to find the most economic methods of food replacement.

Fortunately, British farmers, agricultural contractors, the technical and scientific services of the Ministry of Agriculture, and the departments of agriculture and agricultural economics in the universities, had already had 18 years experience of increasing food production. Various methods were well known. It only remained to make comparative studies of the costs and returns of the numerous possibilities for which techniques were available. For some of the alternatives, figures were already in existence and awaiting some methodical application. But in the constant search for solutions to the problem, new avenues were always being probed—and for these, economic data was not readily available. One type of work in this category was the reclamation for agricultural use of widely distributed areas of woodland. It is with this that we are now concerned but, from what has already been said, it will be appreciated that the value of such work can only be assessed in relation to alternative methods of agricultural development. It is to some of these, therefore, that we must next give our attention.

### *Some Means of Food Replacement*

Although it is often argued that Britain could best serve her own ends by increasing the efficiency of her manufacturing industries and thereby eliminating the shortage of foreign exchange for essential imported foodstuffs, it is by no means certain that such a policy will ever be a practical proposition. For whilst supplies seem likely to remain physically available, Professor E. A. G. Robinson has concluded that Britain is unlikely to be able to afford imports at more than about four-fifths the 1938 level.[2] If this is so, food replacement at home will remain essential.

The comparative economics of various domestic methods of replacement have been summarized in a recent book by Dr. G. P. Wibberley[3] in which he draws on his own wide range of surveys plus many other works relevant to this topic. Using the potential output of land already scheduled for urban development as a basis for his calculations, he ap-

[2] Robinson, E. A. G., "The Future of British Imports," *The Three Banks Review*, No. 17, Edinburgh, March, 1953. *Idem*, "The Problem of Living Within our Foreign Earnings," *ibid.*, No. 21, March 1954. *Idem*, "The Cost of Agricultural Import Saving," *ibid.*, No. 40, Dec. 1958.

[3] Wibberley, G. P., *op. cit.*

TABLE 1. COMPARATIVE CAPITAL COSTS AND RETURNS OF ALTERNATIVE METHODS OF FOOD REPLACEMENT

| Method | Capital cost of food replacement per urbanized acre (1955/56 values) | Return on capital invested |
|---|---|---|
| | *Pounds* | *Per cent* |
| Comprehensive improvement of hill farms | 351 | 4–5 |
| Coastal reclamation | 118–225 | 2½–10 |
| Reclamation of dry sand and gravel workings | 137 | 10 |
| Reclamation of open-cast coal and iron workings | 820–3772 | below 1.4 |
| General intensification of agricultural production | 165 | 13.8 |

Source: Wibberley, G. P., *Agriculture and Urban Growth*, Michael Joseph, London, 1959.

plies the levels of output, costs and returns derived from the various investigations, to arrive at the capital costs of making good the output lost to urbanization and the rate of return on capital expended in the process. For some of the more important avenues of investment, Wibberley's figures are listed in Table 1.

Of these various activities, it is only the general intensification of agricultural production which requires an additional comment here. This is the only one which offers an opportunity to make good all the agricultural output likely to be lost as a result of urban development. According to Cheveley and Price,[4] such a programme will call for an investment of £439,000,000 of which £100,000,000 will be required for land reclamation and improvement. But investment in land can vary tremendously as regards costs and returns, and it is most important to have as much information as possible on the economics of the process—particularly if, for want of capital, the total investment may fall well below the full estimated requirement. Hence the importance of examining woodland reclamation—which, as is shown later, is completely compatible with a programme of general intensification.

## *Woodland Reclamation*

### *Early development*

Interest in the possibilities of woodland reclamation developed only slowly over the period we have been discussing. Wartime and early post-war efforts at land reclamation and improvement made very few inroads into this reservoir of potential farmland. For one thing, such work was obviously more expensive than the cultivation of open land—of which there was sufficient to occupy most people's attention for a considerable time. Secondly, if woodland was to be reclaimed quickly

[4] Cheveley, S., and Price, O., *Capital in United Kingdom Agriculture—Present and Future*, Imperial Chemical Industries, London, 1955.

enough to play any part in solving immediate problems, it called for the use of heavy equipment which was not readily available. Thirdly, there were grave doubts about the agricultural usefulness of most woodland soils—a feeling that there was considerable difference between expenditure on open land which had become neglected because of low prices, and greater expenditure on land which had been deliberately planted to forest at considerable expense and which, in many cases, was known to have been selected for afforestation because of its low fertility. Fourthly, there was the added complication of timber needs being almost as vital a consideration as food requirements.

Many wartime records give the impression that a great deal of woodland was actually reclaimed between 1939 and 1945. But investigation shows that this work was really concerned with the removal of scrub and occasional small trees which had established themselves amongst deteriorated pastures. It was certainly in tackling such limited tree growth that the first experience was gained in the use of new heavy machinery which had become available in quantity by the end of the war, but it was not until the late forties and early fifties that farmers and contractors began to use their newly acquired techniques on dense woodland growth. By early 1954, however, many densely wooded areas had been, and were being, tackled with the aid of grants under the Marginal Production Scheme—grants which, as far as the individual farmer was concerned, helped remove another of the major obstacles to woodland clearance (i.e. the high initial expense). Examination of Marginal Production records leaves no doubt that most true woodland reclamation was, in fact, taking place where alternative types of reclamation had been largely completed. Hence, by 1954, three legitimate objections to such work had disappeared. The conflict between forestry and farming interests still remained, and does even today. But whilst this may have slowed down reclamation to agriculture, many thousands of acres were, nevertheless, being brought into food production.

*A methodical approach*

In 1954 the Research Group of the Agricultural Land Service of the Ministry of Agriculture and Fisheries, began an investigation of the situation regarding woodland reclamation. As often is the case, official action was a reflection of a public interest which already existed. Yet there was ample justification for careful survey and analysis of work already completed or under way. In the first instance, the enquiry into this type of work was only part of a more general enquiry into rural land wastage and, as such, was concerned with discovering the extent of the opportunity for more reclamation of this kind. For a sample area which seemed

to have great prospects, this job was duly completed.[5] But this was a time when interest in economic food production (as opposed to mere physical output) was becoming much more widespread. There was need, therefore, for an investigation into the economics of the work for several reasons. First, detailed records of output after reclamation were not officially available and, where farmers appeared to be satisfied with results, there were inevitably doubts as to the true situation because of the public defrayal of a large part of the costs under the Marginal Production Scheme. Secondly, there were several methods of reclamation in common use which seemed to be having considerable bearing on the purely physical aspects of the work, and possibly on the economics. Finally, woodland of greatly differing type was being tackled and, from the viewpoint of future work, it was essential to know whether physical and economic results varied according to woodland type. Accordingly, these were the major points of concern when the A.L.S. Research Group carried the investigation further in co-operation with the staff of Wye College, University of London.[6]

*The scope for woodland reclamation*

Although the survey was conducted in the county of Hampshire, it was designed so that its main conclusions would be more generally applicable. The main considerations were, that local variations in method of reclamation should be classified into groups that were meaningful elsewhere; that soil types on the sample sites should be grouped in such a way as to constitute broad categories which were recognizable at least over the well-wooded southern half of England; that farms also should be grouped into type of farming categories which were common to the latter area; and that the woodlands themselves were reasonably representative of those beyond the county boundary. The survey did meet these requirements, and its findings have already proved useful elsewhere.

The total forest area of Great Britain has little or no significance for our present purposes, because the country is already committed to a policy of increased timber production. But the woodland census completed between 1947 and 1949[7] does include some relevant figures—

[5] A.L.S. Research Group, *Reclamation of Derelict Woodland for Agricultural Use—Part III, Reclaimable Sites in Hampshire,* Ministry of Agriculture, Fisheries and Food, Reading, 1955.

[6] Hilton, Norman; Tyler, G. H.; and Ward, J. T.; *The Reclamation of Derelict Woodland for Agricultural Use,* A.L.S. Tech. Rept. No. 1, Ministry of Agriculture, Fisheries and Food, London, 1957.

[7] Forestry Commission Census Report No. 1, Census of Woodlands 1947-1949, Woodlands of Five Acres and Over, H.M.S.O., London, 1952.

584,000 acres of privately owned derelict woodland in England and Wales, and 383,000 acres considered unsuitable for future economic forestry operations. If the latter area could be reclaimed for agricultural use, no loss of potential forestry income would be involved. And as regards the larger acreage, few people doubted that if it was suitable for agriculture at all, such a use would yield a greater economic return than forestry. The main requirement, therefore, was for evidence of the agricultural potential of land in this category.

The Hampshire survey showed that about one third of the land in that county presented no great obstacle to reclamation, either technically or as regards high costs.[8] But in the light of the information gained on the nature and value of completed reclamation during the later stages of the survey, it would appear that the one third figure was much too conservative. Much of the remaining two thirds was considered doubtful on grounds of shape, slope, and drainage difficulties. But investigation showed that oddly shaped sites were capable of being incorporated with existing fields which were often improved in shape as a result of the additions; that slopes steeper than one in six (which was considered the practical limit for cultivation in the early analysis) could be farmed quite satisfactorily; and that the returns from most reclaimed land were high enough to bear some additional drainage costs. On the whole, therefore, there would appear to be plenty of scope for this type of work.

*The importance of reclamation method*

Common methods of reclamation were studied in the survey and are dealt with in the main report.[9] They are described in more detail in one of the Ministry of Agriculture's leaflets.[10] The details need not concern us now, but a general point should be noted. Variations in cost between alternative methods sometimes amounted to about 25 per cent, without the more expensive method necessarily having any technical advantages. In many cases, however, there were great differences in the quality of the finished work (particularly as regards disturbance of the soil and subsoil) which affected the quality of the crops for many years after reclamation, and hence the financial returns to the farmer. In such cases, even a 25 per cent cost differential was quite insignificant compared with the difference in returns resulting from good quality reclamation work—a point which must be considered in all future reclamation, and which

[8] Hilton, Norman; Tyler, G. H.; and Ward, J. T., *op. cit.*

[9] *Ibid.*

[10] Ministry of Agriculture, Fisheries and Food, *Tree, Bush and Stump Clearance*, Fixed Equipment of the Farm, Leaflet No. 36, H.M.S.O., London, 1959.

is stressed in all the published works resulting from the Hampshire survey.

*The financial returns from reclamation*

Financial returns are affected by the costs of the reclamation work, the crop yields of the reclaimed land, and the costs of normal farm operations on the land after reclamation. We have already noted that initial costs vary considerably, but that variation here is relatively insignificant in the long run because of the "once and for all" nature of this item. In future work initial costs may well be even less significant, because the range of individual costs could be considerably reduced by careful selection of reclamation method in the light of the information gained during the Hampshire survey, and now available to potential reclaimers.

Crop yields will, of course, remain important, but a very surprising feature of the Hampshire investigation was the very high level of yields on much of the reclaimed land. On average, yields were just slightly higher than national figures, but the survey averages were lowered considerably by individual cases where the operations were not completely successful. In future, similar experiences could easily be avoided by adopting the methods of selection recommended in the published report,[11] and yields in the higher bracket could reasonably be expected—though a word may now be in order as to why this should be so. The reason lies in the nature of Britain's woodland, a high proportion of which lies in small lots scattered amongst the cultivated land of the farms and in the pastures of the estate parklands. Most of the woodland in this category was planted during the 18th and early 19th centuries for the growth of estate timber, the provision of sheep-folds, game-cover, and general amenity purposes. It was valuable in the social and economic circumstances of the time, but is now largely superfluous and is occupying land which is indistinguishable in quality from the good farmland which surrounds it.

Although both costs and physical yields are important influences on the financial returns to reclamation, the survey showed that the vital consideration is the annual cost of farming the new land. Cases investigated fell into two groups from this point of view, and these are examined in the following paragraphs.

In one group the reclaimed land represented considerable additions to the acreages of the farms involved, so that increases in the regular labour force, additional farm machinery, and new fixed-equipment became necessary. These items meant new expenditure, over and above the

[11] Hilton, Norman; Tyler, G. H.; and Ward, J. T.; *op. cit.*

costs of seeds, fertilizer, lime and tractor fuel which were incurred in cultivating the additional acreages. Gross annual returns from the land averaged £26 per acre, but because of the necessity to deduct full working costs, the average net return was reduced to £10 per acre.[12] The average rate of return on the gross cost was 24 per cent—a figure which compared favourably with the rate of return on cases in the other group, but which was largely attributable to fortuitously low reclamation costs. Cases in this group were certainly not typical of reclamation work in the survey area, but they do illustrate the point that land which is inherently well worth cultivating is available even in a country which has been active in this field for about 15 years. One case in the group involved the use of reclaimed land for intensive vegetable production, and this, in particular, shows the value of reclamation even for enterprises which could easily bear the cost of current land prices.

The overwhelming majority of cases in Hampshire fell into the second of our major groups. They varied considerably in the inherent quality of the land involved, and also in the type and standard of farming to which the land was put after reclamation. These variations accounted for the great range of annual net returns which investigation uncovered (i.e. − £4 to + £39 per acre). The important characteristic of the group, however, was the fact that in every case the reclaimed land could be worked by the regular labour force, machinery and fixed-equipment already existing on the holding. Costs of production on the new land, therefore, were limited to the expenditure on seeds, fertilizer, and fuel (plus, in a few cases, a small charge for casual or overtime labour). Average net return for the group was £14[13] per acre per annum—a level reduced by a few unsuccessful operations which need not be repeated now that more is known about the conditions conducive to both success and failure. Expressed as a percentage of total capital cost, the £14 figure amounts to a rate of return of 25 per cent—again affected by the jobs that failed (range, − 17 per cent to + 83 per cent).

*The significance of the survey results*

All the costs quoted above are gross: that is, inclusive of all grants and subsidies paid by the community to the farmer. The costs to the farmer were consequently much lower, and the rates of return on his capital much higher (average 42 per cent). Practically all the cases studied involved grants under the Marginal Production Scheme, a condition of which was that the work should be economically unattractive without the grant aid. The survey showed, therefore, that public in-

[12] *Ibid.*
[13] *Ibid.*

vestment in this field was not justified under the terms of the Marginal Production Act. But that act was intended primarily as an encouragement to greater overall production—and it certainly provided the incentive for work which, on the face of it, appeared risky.

Fortunately, any conflicts which might have arisen as a result of the Hampshire survey are no longer valid in the light of the current agricultural policy. Today, with the emphasis on economic work, grant aid for woodland reclamation would seem to be perfectly justified. It might be suggested that there is no need for expenditure of public funds when returns can be so high. But it should be remembered that investment in such work is only one call on the individual farmer's private capital. Other farm improvements, particularly to farm buildings, are urgently required, and are now receiving the lion's share of agricultural investment under the provisions of the Farm Improvement Scheme. Financial help for woodland reclamation (still possible under the latter scheme) may well be a vital consideration in a farmer's decision to do this type of work. And, from a national point of view, reclamation has the advantage of now being a known quantity, whereas some other forms of investment have yet to be so thoroughly investigated.

A particularly attractive aspect of woodland reclamation work is that it increases individual farm output at low cost and thereby meets one of the major requirements of British agriculture as outlined by Cheveley and Price.[14] This is because it permits better utilization of labour, machinery and fixed-equipment which are not working to capacity—a common state of affairs in British farming due to the extreme variability of farm size, and the consequent difficulty of matching labour and equipment to land.[15]

Another point to note is that the Hampshire survey may well call for a consideration of the future of many small woodlands which are not derelict, and are capable of producing useful timber. It is one thing to retain these in forestry if the only cost is a loss of agricultural output from the actual acreage involved. But it is a very different matter, where reclamation could be a definite step towards making a whole farm into a more viable economic unit.

Finally there is the question of replacing the food production lost to urban growth. We have shown that the area of potentially reclaimable woodland in England and Wales is quite considerable, even if we confine reclamation to derelict sites. Calculated as for other means of replacement (and on the basis of the Hampshire figures) the capital cost of food replacement by woodland reclamation works out at £127 per urbanised acre at 1955/56 values.

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[14] Cheveley, S. and Price, O., *op. cit.*
[15] Wibberley, G. P., *op. cit.*

*Conclusion*

Our aim in this paper has been the presentation of information which would permit an assessment of the economic significance of woodland reclamation by British farms. Further, we have been concerned with the significance of such work in a particular set of circumstances—those ensuing from the current British agricultural and land-use planning policies. From what has been written in the preceding pages, it would appear that woodland reclamation has a definite economic significance. In the first place, amongst all the methods of replacing food lost because of urban expansion, it is cheaper than any except coastal reclamation—and it might well be the cheapest of all if, in future, the sites to be reclaimed are selected in the light of knowledge now available. Second, it would appear to be the most rapid way of replacing the lost agricultural output. Third, amongst all the possible avenues for development, it gives by far the highest rate of return on capital invested. Fourth, woodland reclamation seems to have great possibilities as a means of increasing the efficiency of individual farm units—another vital consideration in view of the national agricultural and overall socio/economic policies. And finally, though the scope for this type of work is not such that it may be put forward as a kind of panacea, it would seem to be sufficient for it to play a vital role in the general intensification of British agriculture, which many economists foresee as the only long-term solution to the country's agricultural and general development problems.

# NOTES

## AGRICULTURAL POLICY IN THE EUROPEAN COMMON MARKET

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THE SIX European countries[1] that are in the process of forming the European Economic Community (EEC) are about to finalize proposals for their "common agricultural policy." These proposals are made up of two basic parts: one on measures for long-term structural adjustments, such as land consolidation, meliorations, farm credit, technical training, help for shifts out of marginal farms, etc.; and another part on market and price policy. The present statement will concentrate on the latter.

The essence of the present plans of the EEC in the field of market and price policy provides for variable import levies on grains, pork, poultry, and eggs. Quantitative restrictions may also apply. For some of the remaining agricultural commodities for which fixed tariffs are proposed, special market regulation, preferences for overseas or associated territories, and quantitative emergency restrictions are envisioned. Fixed tariffs, in some further cases, are proposed at high levels. Export surpluses of some products are expected to result from such measures; and subsidies are proposed for their disposal at home and abroad.

Although no agreement has yet been reached—and none is likely to be reached for some time to come—with respect to the common producer price levels to be secured and protected by these devices, enough has been written about the positions of individual governments and farm organizations to make it certain that any conceivable common price levels will, on the average, bring increases. High-price countries are unwilling to lower farm prices; low-price countries would probably be willingly inclined toward increases. And these increases will be precisely in areas where expansion of output is most feasible and likely. In these circumstances the envisioned producer price unification has a built-in tendency toward increased protection, expansion of output, and "surplus" production.

### *The Content of Protection*

It may be useful to examine briefly the most important changes by which the present proposals depart from the Common Market Com-

* This article expresses the personal opinions of the author and does not necessarily reflect officially accepted views.

[1] France, Germany, Italy, Netherlands, Belgium, Luxembourg.

mission's original suggestions for "a common agricultural policy." Such an examination indicates the direction in which the Community has moved in the past two years. Unfortunately, there is no indication of a moderation of agricultural protection. On the contrary, the system now proposed is one under which few bindings for major products produced in the community can be negotiated; if accepted, it would amount to a removal of much of EEC's agriculture from the international discipline of the General Agreement on Tariffs and Trade (GATT), unless other obligations are undertaken to assure maintenance and expansion of trade with third countries.

The proposals retain most of the basic ideas and provisions of the original draft proposals of the EEC Commission. The most important change is an extension of the system of variable import levies, contrary to the hopes of third countries with agricultural export interests, and in disregard of their protests. The levies are to apply to pork, poultry, and eggs, in addition to grains. They will aim to bring and hold import prices at least to the comparable level of the prices sought for the domestic product. All variable levies are to take effect soon, probably early in 1962.

The levies are also to take the place, inside the area, of intra-area tariffs and other restrictions. By tapering them off gradually between members, this system is to assist the gradual approximation of unified producer prices throughout the region.

In a number of recent declarations, the Commission and some of the Common Market governments have emphasized that they have by no means abandoned the idea of long-term delivery agreements and contracts between exporting and importing member countries. Such agreements are even to be reinforced, in the transitional period before a common price level has been established, by setting the variable import levies a country applies towards other countries of the Community, in relation to those it applies towards third countries, in such a way as to assure "a preference in favor of the member states."

Considerable importance also attaches to the proposals with respect to export aids. First of all, import charges will be refunded for exports of "corresponding" products. This would mean that the exportation of soft wheat (or flour), for example, could be encouraged by a "refund" of the import charges upon quality wheat. Beyond that the Commission stated that proper management of some markets will also require them to provide for the possibility of exports by the private trade for the account of one of the Boards that will be set up for the various commodity programs. And there is provision for Board measures, including subsidization, to "enable the Community to secure a fair share [for any

one product] in world trade." This provision will deserve special scrutiny by outside countries.[2]

The introduction of variable import levies in intra-area trade to some extent mitigates the great internal problems resulting from the fact that the prices for many agricultural products in the individual countries of the Community differ greatly from each other. As a result of vigorous opposition, even the small first move towards lessening these differences for grains and sugar, which the Commission had proposed last year, is unlikely to be taken during the harvest year 1961-62. In fact, no decisions on common producer price levels have yet been made—a fact that makes it particularly difficult for third countries to appraise the probable impact of the Community's policy. On the other hand, it is quite possible that later, when price levels have been agreed upon, the EEC may be willing to negotiate maxima for the variable fees.

Although much will thus depend on the level at which agricultural products will be supported, it is clear that variable price equalization for imports and possible quantitative control, as well as a policy of "import first from the Common Market and its overseas territories" would represent an inducement for uneconomic agricultural expansion.

*Expected Effects on Production*

An expansion of feed grain production is admittedly aimed at. This will affect exports from third countries. The excessive production of soft wheat, of which there is already a surplus, would most likely be maintained. Since the Common Market area will also include in its benefits imports from the French and Belgian overseas territories, there may be long-run unfavorable effects upon third countries' exports of tobacco, cotton, oilseeds, seed oils, and citrus fruit. Fruit from third countries in general may also be affected by quality and packing specifications, and by emergency clauses for suspension of imports.

These expectations are, in general, confirmed by the Commission itself. In a recent publication[3] concerned with projections for 1965, the Commission, for example, estimated that imports of *wheat,* over 3 million tons on a net basis in 1955-57 (including a bad crop year), may be reduced to almost nothing by 1965. The report comments, "The quantities that will have to be imported for quality reasons will make it necessary for the member countries to export or stock equivalent quantities." The Commission makes no attempt at hiding its view that, to prevent fur-

[2] It should be noted that the term used is "to secure," not "to maintain" a fair share in world trade.

[3] See European Economic Community, *Tendances de la production et de la consommation en denrées alimentaires dans la Communauté Economique Europeenne.* (Brussels, 1960.) Also see, *Foreign Agriculture,* April 1961.

ther expansion of production and to encourage the feeding of lower quality wheat, prices would have to come down.

For *feed grains,* the middle estimate of the Commission foresees a net import of only about 5½ million tons, compared with 6½ million in 1955-57. Both figures include the grain equivalent of imported poultry, eggs, and pork (260,000 tons of grain equivalent in 1955-57). The Commission leaves no doubt about the need for avoiding acreage expansion and price increases. Otherwise, it points out, the position for feed grains might become as uncomfortable as that for wheat, as a result both of expanded output and of reduced demand for animals that have been fed with expensive grain.

For *dairy products,* an average export surplus in 1955-57 of 300,000 tons (expressed in terms of whole milk) is expected to grow into a surplus of from 4 million to 6 million tons, corresponding to 160,000-240,000 tons of butter. The reason given is the further expansion forecast in France—an expansion "that could not possibly find buyers . . . at present prices for dairy products."

For *sugar,* the middle estimate is an export surplus of 500,000 tons by 1965 (France and Italy), compared with an import deficit in 1955-57 of 137,000 tons.

The most interesting aspect of these projections is the fact that they are based on the assumption of a continuation of present policies in member countries. They do not, therefore, take into account the future impact of the Common Agricultural Policy (much of which, including prices, remains to be settled). As indicated above, there can be no doubt as to the direction in which this policy will influence imports.

### *The Status of Negotiations*

The arrangements for agriculture thus far proposed by the EEC are now being tested in the so-called Article XXIV negotiations in GATT, which aim to determine and assure compliance of EEC unification plans with the formal requirements of GATT. These requirements demand that, so far as internal arrangements are concerned, the economic union apply to *all* goods, agricultural as well as industrial; and, with respect to the outside world, that the Common Market's protection not exceed the general incidence of the "tariffs and other regulations of commerce" practiced by the individual countries making up the union. The problems which these negotiations uncovered could not be fully settled before the beginning of phase II of the GATT talks, the regular tariff negotiations. The pending problems under Article XXIV are to be carried over for continued negotiation. Much will depend, for GATT and for the future of international economic relations, on the outcome of this effort. For the European Economic Community will represent a

powerful separate economic force in the world. It is inevitable that whatever system of protection the rest of the world agrees to in this case will not remain without influence upon policies of other countries and of other regional groupings.

*Principles for Compromise*

United States support for the European Economic Community (EEC) or Common Market has recently been reaffirmed by the Administration. The growth of an economic union among the six participating countries, with a population of 170 million, has been hopefully viewed as a strong support for political coherence and amity in the western world, as well as for its economic prosperity.

In order that economic union contribute to these ends, it is essential that it be implemented in a forward-looking, liberal, trade-creating manner. Protectionist and trade-diverting implementation could bring neither unity nor prosperity, but would tend toward division in Europe and in the western world.

In contemplating an unpalatable extreme of consequences that might result from the present impasse, GATT members must not relent in laboring for acceptable compromise. The bases for such compromise might be sought in two fundamental propositions that are reasonable enough to commend themselves for acceptance both by the EEC and by the outside countries. If agreement on these basic propositions is reached, the premises they imply should lead to a workable solution.

The two propositions are as follows:

1. The purpose of outside agricultural exporters is to obtain reasonable assurance that their exports to the EEC area are maintained at recent levels and can share in any expansion of demand.

2. The avowed purpose of EEC in proposing "a common agricultural policy" has always been to assure graduality for market unification *within* the area, not to intensify protection towards *outside* areas.

On this basis, the possibilities of a system of producer subsidies might well be explored under several points of view: First, a unification of market prices could at once be accomplished. Second, market prices would be nearer world parity and would result in expanded consumption for products of elastic demand—fruits, meat, eggs, and (via derived elasticity) feed grains. Third, imports could be completely freed from quantitative restrictions and subject to moderate fixed tariffs (instead of variable levies) as the only form of protection. Fourth, the insistence of the higher-protection countries upon maintenance for an indefinite period of their levels of protection could be made less difficult to deal with—each to supplement the unified market price by producer subsidies of varying extent. The gradual reduction in the subsidies would then

permit of a smoother, more long-term, and more flexible approach to the ultimate alignment of producer prices. Fifth, such a system could avert the great danger of a built-in increase of protection, with all its consequences, due to price unification being possible only at too high a level if it were applied to *producer* prices and had to be applied soon. To repeat, under this system, market prices could at once be unified; producer prices in each country could for the time being be kept unchanged.

Market prices would not necessarily have to be unified at world price levels; they could be placed, say, at the present French or Dutch level, whichever seems more acceptable. In such a case, deficiency payments might not be as much of a burden upon national treasuries as has been feared. If, for example, the French price level where chosen, no significant deficiency payments would be necessary in France or the Netherlands; even in Germany producer payments could be held to moderate amounts.

Finally, the great advantage from the international point of view would be the fact that we could again have a system that is negotiable, within which safeguards against increased protection could be reasonably agreed upon. In fact, the system would provide much built-in pressure towards moderation of protection through the "visibility", so to speak, of agricultural support by Treasury payments. It would also resolve much of the difficulty that now stands in the way of a full-scale British (or European Free Trade Area) association with the EEC.

It is recognized that there is much opposition to this system not only on the part of those concerned with government finance. And it may well be that no such system will prove acceptable. If so, there may be another way in which the two basic propositions stated above could be applied. Under GATT, member countries are mainly interested in seeing international trade maintained or expanded. Perhaps there are possibilities of assuring the maintenance of international trade in agricultural products, taking into account existing patterns and trends in total requirements, without substantial interference with the policies of individual countries aiming to protect certain income goals for their farmers. But this belongs in another chapter of international economic relations.

# FREE COMPETITION, UNCERTAINTY AND FARMER DECISIONS*

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ELSEWHERE we have detailed a normative model for entrepreneurial decisions under free competition.[1] The model implies that production decisions under free competition devolve to a decision problem under uncertainty, i.e., to a game against Nature. This article presents a few details of an empirical assessment of the descriptive role of the model, followed by an empirical evaluation of the possible role of some of the more reasonable algorithms (Laplace equiprobability, Savage regret, and Wald maximin criteria) for handling games against Nature. The data used relate to the choice of a 1957 cattle feed-lot program by the population of 77 owner-operator cattle feeders between the ages of 30 and 50 in Marshall County, Iowa. These farmers were interviewed four times at six weekly intervals over the latter half of 1957. Such a survey procedure was adopted to ensure good rapport with greater opportunities for obviating patterned responses and for checking the reliability of responses.

## *The Decision Model*

The key feature of the model is the recognition that a free competitor cannot evaluate his alternatives relative to the alternatives open to each of his competitors considered individually.[2] Not only would there be too many individuals involved, but for any generic product there is a large array of alternative processes specifiable in terms of technology and market entry dates. Still, a free competitor cannot ignore his confreres since their choices, together with exogenous influences, determine the price regime he has to face. Accordingly, a reasonable approach for an individual entrepreneur would be to consider his alternatives relative to an *aggregative* opponent consisting of all the other members of the freely competitive group taken in combination with other sources of influence. Even so, both his own alternatives and those of the aggregative opponent are likely to be extremely numerous; some simplification would be essen-

* Journal Paper No. J-3835 of the Iowa Agricultural and Home Economics Experiment Station, Ames, Iowa. Project No. 1135.

[1] Dillon, J. L., and Heady, E. O., "A model for entrepreneurial decisions under free competition," *Metroeconomica* (13(2) (in press) 1961.

[2] This point has been elaborated recently by Richardson, G. B., "Equilibrium, expectations and information," *Economic Journal*, 69:223-37, 1959. However, unlike us, Richardson is "not concerned with what courses of action may be rationally chosen even when information is lacking as to which of several courses others may take" (p. 230).

tial. Assuming he wishes to do better than choose one of his alternatives at random, a practical approach would be to stratify both sets of possibilities, reducing the payoff matrix to workable size by amalgamating the alternatives within each stratum into a single broad possibility.[3]

Assuming such an arrangement of the decision problem, how should a free competitor approach his simplified payoff matrix? He knows each of his competitors can at best use some similar "self *v.* the group" matrix which differs from his in its partitioning of alternatives and expected payoffs. Moreover, he cannot have full information about the partitionings, price expectations, and planned choices of his confreres. In consequence he cannot associate objective probabilities with the alternatives of the aggregative opponent. The payoff matrix therefore depicts a game against Nature.

### *Empirical Assessment of Model*

The survey farmers' choice of a feed-lot program for 1957 was used to assess the extent to which the postulated normative model might actually be used by free competitors. This feed-lot decision problem is well suited to such an assessment insofar as: (a) it involves choice between the wellnigh infinite array of alternative feed-lot programs specifiable in terms of the age, sex, weight and quality of purchased cattle, the feed program to be followed, and market entry dates; (b) the feed-lot enterprise is regarded as extremely "risky" by most farmers; and (c) an aggregate opponent is readily definable in terms of all other cattle feeders, the raisers of feeder cattle, the meat packers, and the weather. Thus, should the model have no descriptive relevance to the feed-lot decision, it is most unlikely that it would be used by free competitors in other real-world contexts.

The method of assessment used was to note for each farmer the extent of agreement between his stated decision-making considerations and a set of criteria pertinent to use of the model. Questioning relevant to these criteria, both direct and check, was carried out at various stages of the panel survey. This oblique approach was used in preference to the rather naive alternative of describing the model to the farmers and asking point-blank whether or not they used it. Figure 1 summarizes the descriptive value of the postulated model for the 77 farmers studied.[4]

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[3] While they have not explored or tested its implications under free competition, such simplification has been hypothesized by: Haring, J. E., and Smith, G. C., "Utility theory and profit maximization," *Amer. Econ. Rev.*, 49:566-83, 1959; Simon, H. A., *Models of Man*, Wiley and Sons, New York, 1957, p. 244; Bruner, J. S., *et al. Study of Thinking*, Wiley and Sons, New York, 1956, p. 232; Luce, R. D., "A probabilistic theory of utility," *Econometrica*, 26:193-224, 1958.

[4] Detailed analysis of the data of Figure 1 and its mode of collection may be found in Dillon, J. L., and Heady, E. O., *Theories of Choice in Relation to Farmer Decisions*,

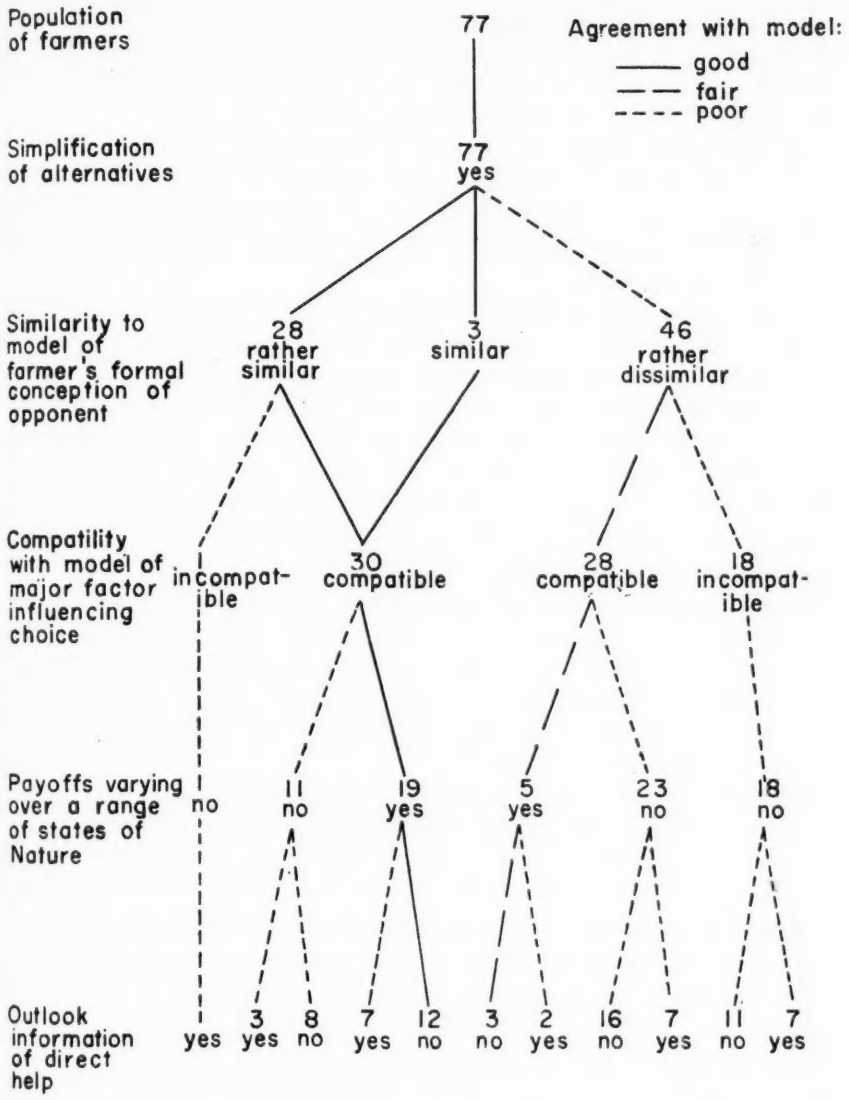


FIGURE 1. CLASSIFICATION OF FARMERS IN TERMS OF AGREEMENT WITH MAJOR ASPECTS OF THE POSTULATED DECISION MODEL.

Good, fair and poor agreement with the model are noted through a range of five criteria.

The first criterion used was whether or not the farmers simplified their

Iowa State Univ. Res. Bul. 485, 1960. The questionnaires used are presented in Dillon, J. L., *An empirical comparison of theoretical and actual decision making under uncertainty*, unpub. Ph.D. Thesis, Iowa State Univ. Libr., Ames, 1959.

range of alternatives as postulated by the model. As the tree indicates, all 77 did so. In fact, only 3 farmers considered more than 5 alternative feed-lot programs, the average number of considered programs being 3 and the mode 2. The second check was based on the farmer's conception of an opposition. With some degree of subjectivity, 31 agreed with the model to the extent of recognizing the influence of other cattle feeders, feeder cattle raisers, and meat packers in some aggregative form. (As well, all 77 recognized the weather as an important influence through its effect on feed supplies.)

To gain some idea of how operational these concepts of an opponent might be and to serve as an additional check on the use of the model, the farmers were later asked an open-ended question as to which factors were most important in determining their choice of a feed-lot program. Nineteen of the farmers placed major emphasis on the expected influence of weather on their home-grown feed supply. Expected cattle prices, either buying or selling, were given a primary role by 28 of the farmers. One nominated cattle purchases by other feed-lot operators. There were 8 who suggested an habitual basis of selection, while 21 nominated "risk" as the major factor influencing their choice. Of these 21, further probing indicated 10 really meant uncertainty rather than risk. Thus there were only 19 of the 77 farmers who nominated a major influence on their choice incompatible with the model and so did not satisfy the third criterion noted in Figure 1. These were the 8 mentioning habit, and 11 of those mentioning "risk."

The fourth check hinged on the farmers' statements as to whether or not they considered their alternative feed-lot programs in terms of payoffs varying according to the conditions that might prevail. These questions were asked specifically in terms of the respondent's choice of a feed-lot program for 1957. Twenty-four farmers said they did consider alternative states of Nature. However, further questioning showed these states to be very broad (as the model postulates). Two of the 24 considered 4 states. The other 22 considered only 2 states. Nine of these pairs of states were based on the possible feed situation, 11 on the possible aggregative buying actions of other cattle feeders, two on the possible cattle-feeding programs of all other farmers, and one on consumer demand for meat. Moreover, as Figure 1 shows, 19 of these 24 who thought in terms of states of Nature also conceived of an opposition similar to that implied by the model and nominated a major choice-influencing factor compatible with the model. The final criterion studied was the farmers' assessment of the value of feed-lot outlook information. Since such information does not relate to specific feed-lot programs, the 50 farmers who thought outlook data of no direct help were in partial agreement with the model in its feeder cattle context.

In summary, as indicated in Figure 1, only 12 of the 77 farmers could be said fairly certainly to consider the feed-lot decision problem in the fashion postulated by our model. The model may have been correct for another 3. It seems most unlikely therefore that the model in its entirety has any general descriptive relevance to the decision making of free competitors. Still, a large proportion of the farmers behaved in partial agreement with the model. All 77 considered a simplified set of alternatives; 58 specified a primary choice-influencing factor compatible with the model; 24 made allowance for payoff variations over possible states of Nature; and 50, insofar as they thought outlook information of no direct help, considered the decision problem as one involving a high degree of uncertainty.

Finally, a construction of their feed-lot decision problem in terms of the model was explained to the farmers. They were then asked whether they thought this construction was a good, fair or poor representation of the problem. The responses were: good—38, fair—26, and poor—13. This rating is subjective. Nonetheless, a majority thought the approach to be reasonable. Such a reaction is not unexpected. As others have noted, once a normative approach to a decision problem has been pointed out to decision makers they will usually recognize it as such and often tend to consider the problem in such a manner in the future. It is interesting that all of the 31 farmers whose conception of an opposition approached that postulated by the model (see row 3, Figure 1) were among the 64 who considered the constructed representation of their problem to be either good or fair. In fact, 26 of these 31 said it was good. Twelve of the 13 who said it was poor belonged to the group of 19 who nominated a primary choice-influencing factor (see row 4, Figure 1) incompatible with the model's conception of Nature.

*Empirical Assessment of Choice Theories Pertinent to the Model*

Any number of well-defined algorithms for solving games against Nature are possible. Perhaps most plausible, though, are: (1) Wald's maximin criterion leading to selection of the act(s) with maximum minimum payoff; (2) Savage's minimax regret criterion which selects the act(s) which minimize(s) maximum regret that might be felt after the true state of Nature is known; and (3) Laplace's principle of insufficient reason which postulates equal probabilities for Nature's states with consequent selection of the act with the largest expected payoff.[5] Accordingly we now assess the possible role of these criteria in improving profit

[5] The mechanics of these algorithms and their axiomatic underpinnings are detailed in Luce, R. D., and Raiffa, H., *Games and Decisions*, Wiley and Sons, New York, 1957, 278-98. Suffice to note here that there are no compelling theoretical grounds for preferring one of these criteria rather than another.

possibilities, using the actual feed-lot decision problems facing the 77 farmers studied. Each farmer's set of considered feeder programs were taken as his alternative acts. For each of these the farmer was asked his expectation of the most probable buying and selling price of cattle under four possible states of Nature. In terms of cropping weather and the months for marketing their fat cattle selected by all other cattle feeders in aggregate, respectively, these states of Nature were as follows:

$S_1$ : good, March to June; $S_3$ : poor, March to June;
$S_2$ : good, June to September; $S_4$ : poor, June to September.

Given the farmer's price expectations, he was immediately asked which alternative(s) he would select and the number of cattle to be fed under each of these programs. Selection of the null alternative was allowed. From this data, the proportion of the farmer's feeder-enterprise resources that would be devoted to each alternative was calculated. *For a given point in the planning stage,* these proportions specify the farmer's *current* solution to his decision problem. The problem was posed in three contexts: with either good or poor weather possible; with good weather certain; and with poor weather certain. In each case it was specified that uncertainty prevailed over Nature's possible states.

Payoff matrices were constructed from the price data supplied by the farmers, payoffs being expressed as the expected annual percentage net return on each act under each state of Nature. Assuming constant returns to scale and profit maximization, these payoffs are directly amenable to preference ordering. Accordingly, the Laplace equiprobability, Wald maximin and Savage regret solutions (with mixed strategies allowed) were calculated for comparison with the farmer solutions. Averaged over the 77 respondents, Table 1 lists these solutions in terms of the expected annual percent net return for each state of Nature in each problem setting. These returns differ little from state to state within each solution. Also, only relatively small differences exist between the average payoffs for the Laplace, Wald and Savage solutions. In contrast, the difference between the farmers' and the theoretical solutions is outstanding. For every state of Nature in every problem setting, the average expected payoff from the farmers' solutions is markedly smaller than that from any of the three algorithms. Moreover, as would be expected given the conservatism of the Wald and Savage criteria in assuming Nature will always do her worst, these algorithms tend to give smaller payoffs than the more daring Laplace approach. Still, these differences are hardly large enough to warrant consideration.

Assuming the data to be derived from a random sample, *F*-tests based on analysis of variance using designed comparisons among the means of Table 1 indicate the differences between the means of the farmers' and

TABLE 1. AVERAGE EXPECTED ANNUAL PERCENT NET RETURN UNDER EACH STATE OF NATURE FOR THE FARMERS', LAPLACE, WALD AND SAVAGE SOLUTIONS OF THE REAL-WORLD DECISION PROBLEMS

| Solution | Good weather certain | | Poor weather certain | | Either good or poor weather possible | | | |
|---|---|---|---|---|---|---|---|---|
| | $S_1$ | $S_2$ | $S_3$ | $S_4$ | $S_1$ | $S_2$ | $S_3$ | $S_4$ |
| Farmer | 20.5 | 19.0 | 18.0 | 18.9 | 20.1 | 19.9 | 18.1 | 18.1 |
| Laplace | 25.4 | 23.8 | 23.5 | 22.9 | 24.9 | 23.8 | 23.4 | 22.9 |
| Wald | 25.2 | 23.8 | 23.0 | 23.0 | 24.8 | 23.9 | 23.0 | 22.8 |
| Savage | 25.2 | 23.8 | 23.3 | 23.0 | 24.8 | 23.8 | 22.9 | 22.5 |

theoretical solutions to be highly significant; also that no significant differences exist among the means of the theoretical solutions. Table 2 shows the percentage increase in expected net return if the algorithms had been used as a basis of choice. In every problem setting examined, the respondents would have been able to increase their expected net return by at least 19 percent on average by using one of the algorithms. Obviously the decision theories examined, together with our normative model of the decision problem, have subtstantial *ex ante* import. Still, nothing can be said of their possible role in reducing *ex post* resource misallocation. That would depend on the correctness of the farmers' price expectations.

Granted the potential of the theoretical algorithms as a means of raising profit expectations, can anything be said from the real-world decision problems of their possible descriptive role? The answer is no. Those few cases in which the farmer and theoretical solutions coincided appear to be due to chance. This contrasts with the fact that a majority of the farmers tended to use a Laplace or Wald type of approach in solving a set of hypothetical decision problems.[6] Although a multitude of factors probably contribute to this discrepancy, only three will be noted here. They are hypothesized as the most important.

TABLE 2. AVERAGE PERCENTAGE INCREASE IN EXPECTED ANNUAL PERCENT NET RETURN UNDER EACH STATE OF NATURE IF THE FARMERS HAD USED THE LAPLACE, WALD OR SAVAGE CRITERIA

| Criterion | Good weather certain | | Poor weather certain | | Either good or poor weather possible | | | |
|---|---|---|---|---|---|---|---|---|
| | $S_1$ | $S_2$ | $S_3$ | $S_4$ | $S_1$ | $S_2$ | $S_3$ | $S_4$ |
| Laplace | 23.9 | 25.3 | 30.5 | 21.2 | 23.9 | 19.6 | 29.3 | 26.5 |
| Wald | 22.9 | 25.3 | 27.8 | 21.7 | 23.4 | 20.1 | 27.0 | 26.0 |
| Savage | 22.9 | 25.3 | 29.4 | 21.7 | 23.4 | 19.6 | 26.5 | 24.3 |

[6] See Dillon, J. L., *An empirical comparison . . ., op. cit.* Relative to the 77 farmers studied, this reference also contains an assessment of the theories of choice associated with the names of Shackle, Simon and Hurwicz, together with some discussion of the subjective probability approach suggested by Savage.

First, we assumed maximization of expected profits to dominate the decision maker's appraisal of his problem. Perhaps this is too unreal; nonmonetary considerations as well as higher moments of the distribution of each payoff element may have been pertinent. Second, the strangeness of the format in which the problems were presented, implicitly using our normative decision model, may have confused some of the respondents. Such a possibility is evidenced by the fact that few of the farmers conceptualized the decision problem completely in the fashion of the model. Last, our analysis used synthetic payoff matrices. The development of these matrices involved a series of cumbersome calculations. Implicitly, we assumed the farmers could also make these calculations, or make the necessary adjustments intuitively from experience. This assumption is very strong. Its lack of fulfillment might account for much of the discrepancy between the farmers' solutions and the theoretical strategy selections.

Another possibility is that the respondents may have been using the theoretical algorithms, not in relation to the real payoffs implied by their price expectations, but in terms of some naive payoff set. The simplest such hypothesis is that a choice was made merely in terms of the margin between expected buying and selling prices of cattle. However, no worthwhile correspondence was evident between the theoretical and farmer solutions under such a naive formulation. The hypothesis must be dismissed. Nonetheless, a majority of the farmers did solve their real-world problems in an active way. This we know because a check against their feeder cattle operations in the prior three years showed 49 of the 77 farmers to have solutions that varied from year to year. On these grounds, we cannot dismiss the considered algorithms as playing no descriptive role in the real-world problems. They may have been used, even though we are unable to specify their operational bases. Assuredly though, the algorithms were not used in terms of the normative model implicit in our manipulation of the real-world problem. *Ipso facto,* their use should reduce *ex ante* resource misallocation. That it does has been shown in the previous section.[7]

### *Conclusion*

In summary, the normative decision model, in its entirety, had descriptive value for only a small proportion of the individuals studied.

[7] What of the 28 farmers who appeared to follow some habitual solution, having had the same feeder cattle program over the prior three years? Half of these were farmers who considered only a single alternative. Maybe the theories played some role over the longer run in initially determining their habitual selection; more likely, the original decision may have been based on an aspiration level approach. Perhaps on first entering the feeder game they found a strategy that was satisfactory and simply maintained the same pattern of resource allocation, never seeking anything better.

The hypothesis that the postulated model might actually be used by any appreciable number of free competitors appears untenable. Nonetheless, a majority of the respondents behaved in partial agreement with the model to the extent of simplifying their range of alternatives and either recognizing an aggregative opponent or considering alternative states of Nature. The possible role of the Wald, Laplace and Savage algorithms for decision making under uncertainty, used in conjunction with our model, was noteworthy. For the real-world problems examined, use of these procedures would have increased the respondents' expected profits by at least 19 percent, on average. Concomitantly, our postulated decision model must be recognized as having worthwhile normative possibilities.

## SUPPLY FUNCTIONS FOR MILK UNDER VARYING PRICE SITUATIONS

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IT IS a generally accepted hypothesis of supply theory that the elasticity of expansion under rising prices exceeds the elasticity of contraction under falling prices. However, little work has been undertaken to confirm this hypothesis. In fact, most empirical estimates of supply elasticity have been obtained without reference to the direction of price change. This leave serious doubt as to the predictive value of these estimates. This paper reports the findings of an analysis of the irreversibility[2] of the short-run supply function for milk. Regression techniques were used in deriving a regional supply function from time-series under four different price situations.

### *Theoretical Considerations*

In a recent article, Glenn Johnson[3] states that greater emphasis in supply analysis should be placed upon concepts which permit the prediction of quantities and prices, and of changes in quantities and prices under defined conditions. In most of the studies on record, estimates of supply

[1] The author is indebted to B. F. Stanton and M. W. Kottke for helpful suggestions. The opinions expressed in this paper are those of the author, and do not necessarily represent the views of the Farm Economics Division or the USDA.

[2] Reversibility is here defined as the backward movement along a given supply function. The term is sometimes used with reference to the backward shifting of the whole supply function.

[3] Glenn L. Johnson, "The State of Agricultural Supply Analysis," *J. Farm Econ.*, 42:452, May 1960.

elasticities have been determined for a given geographical region and a given time period (e.g., U.S., 1926-55). A few studies have compared elasticities between regions and between time periods. Still fewer studies have been conducted in which an attempt has been made to relate elasticities to the direction of price change.

The "average" elasticity for the United States as a whole may not be relevant for any region within the country. Similarly, an average elasticity for all price situations may not be relevant for any specified direction of price change. But the analogy is not completely appropriate. Regional and national estimates of supply elasticities are both useful. However, if

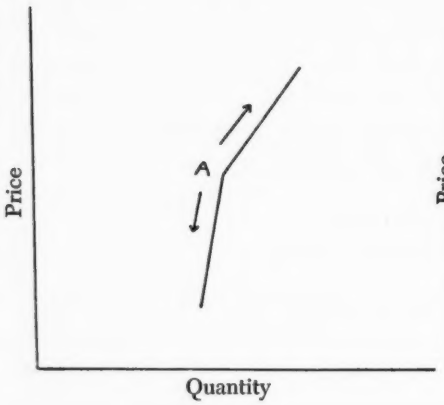


FIGURE 1.

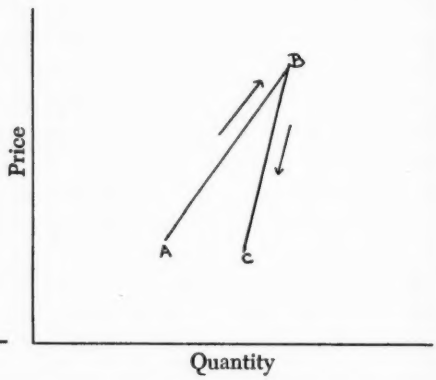


FIGURE 2.

the difference between the elasticity of expansion and contraction is very large, then the elasticity estimate that assumes a reversible function will be misleading. Under these circumstances, computing the average elasticity might be compared to choosing the mean of a bimodal distribution.

The classical supply function is assumed to be reversible and symmetrical in the long run. Expansion in production with a price rise and contraction in production with a price fall occur along the same path. The fact that adjustments or responses to short-run price changes occur at unequal rates gives rise to the concept of irreversibility. The irreversible function is referred to in the static context as being "kinked." Given the level of price and output (Point A in figure 1), change can occur in either direction. In figure 1 the elasticity of expansion exceeds the elasticity of contraction. In the dynamic frame of reference, contraction will follow expansion or vice-versa. The supply function in figure 2 is irreversible because the initial point (A) and the final point (C) do not coincide. It might be more appropriate in the short run to talk of two supply functions, one for rising and one for falling prices.

In reality, an infinite number of economic conditions affect the magnitude of supply response over a specified time period, and hence there is an infinite number of functions. This calls to mind the concept of a fan of supply curves, but one of quite different origin than that conceived by Cassels.[4] With a fan for rising and a fan for falling prices, the particular elasticity would be determined by the external circumstances associated with price change. Some situations would encourage farmers to reinvest a large portion of their earnings, or to extend their loans, while other circumstances would call for more cautious action on the part of both lenders and borrowers. An obvious example would be the degree of certainty associated with the price change. However, these qualitative differences do not lend themselves easily to quantitative analysis.

The most important single factor controlling the ability to expand or contract is the profits and losses sustained by farmers. The income situation is reflected by change in the complex of product and input prices. Hence, the price movements provide a basis for obtaining quantitative estimates of elasticities. The prices of milk and feed were used in this analysis.

### *Method of Analysis*

Halvorson[5] in a recent study examined elasticities under rising and falling prices for milk production in the United States. Using a Nerlove[6] distributed lags model, he derived both long and short run supply elasticities. In several of his equations, the elasticity of supply under falling prices exceeded the elasticity under rising prices. Halvorson emphasized that the differences encountered were not statistically significant. He suggested that further research would be necessary to identify the true nature of the kink in the supply curve.

The analytical procedure used in this study differed from that used by Halvorson. Four periods of price change were defined, based on price trends and short run changes in price. The method used is described as follows.

Observations of milk and feed prices were obtained for the Lake States region (Michigan, Wisconsin, and Minnesota) for the period 1926-58. First, milk prices were deflated by the index of prices received for all farm products and divided into periods of rising and falling

[4] John M. Cassels, "The Nature of Statistical Supply Curves," *J. Farm Econ.*, 15: 378-87, Apr. 1933.

[5] Harlow W. Halvorson, "The Response of Milk Production to Price," *J. Farm Econ.*, 40:1101-13, Dec. 1958.

[6] Marc Nerlove, *The Dynamics of Supply*, Baltimore, Md.: Johns Hopkins Press, 1958.

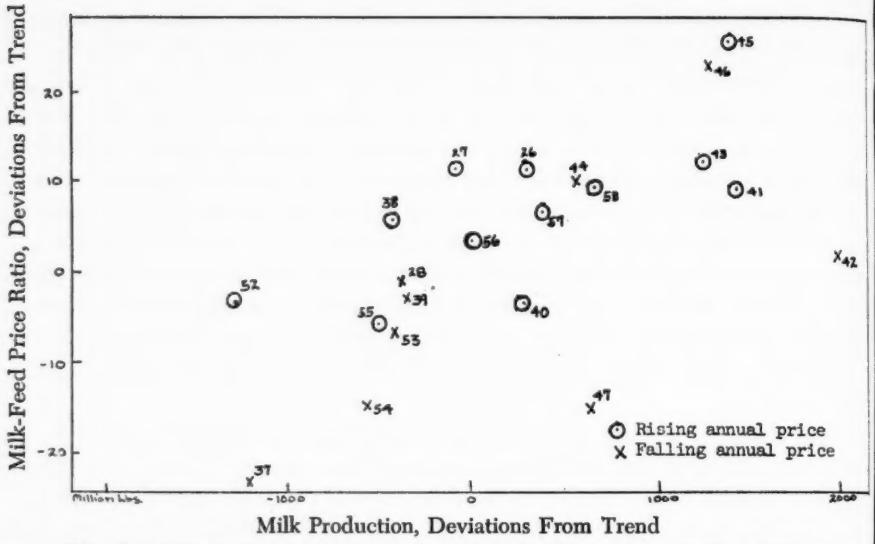


FIG. 3. ANNUAL OBSERVATIONS OF THE MILK-FEED PRICE RATIO VS. MILK PRODUCTION FOR YEARS OF RISING PRICE TREND, LAKE STATES, 1926-58: OBSERVATIONS FOR EACH SERIES ARE DEVIATIONS FROM THE EXPONENTIAL TREND.

price trends. These trends reflect the long run direction of change in the price of milk. Dairy farmers respond to long run price changes principally by varying cow numbers. Some farmers go out of business, and those who remain expand herds in keeping with long run prospects and their financial position. Irreversibility is usually associated with expansion or contraction of fixed assets such as livestock facilities.

Five periods of price trend were distinguished. Years of rising milk prices were 1926, 1935-45, and 1951-58. Years of falling prices were 1927-34 and 1946-50. Once established, the price intervals were advanced two years to allow for the lag in adjusting cow numbers. The trend in price was more pronounced in some periods than in others. The division of years necessarily required some arbitrary judgment on the part of the author.

Then, observations of milk and feed prices were expressed as a ratio. Years in which the milk-feed price ratio rose over the previous year were distinguished from years in which the ratio fell. There were thus four categories of observations: (1) rising milk price trend, rising annual price ratio, (2) rising milk price trend, falling annual price ratio, (3) falling milk price trend, rising annual price ratio, and (4) falling milk price trend, falling annual price ratio.

These groupings are shown in figures 3 and 4. In these scatter diagrams, the trend has been removed from the milk production and milk-feed price

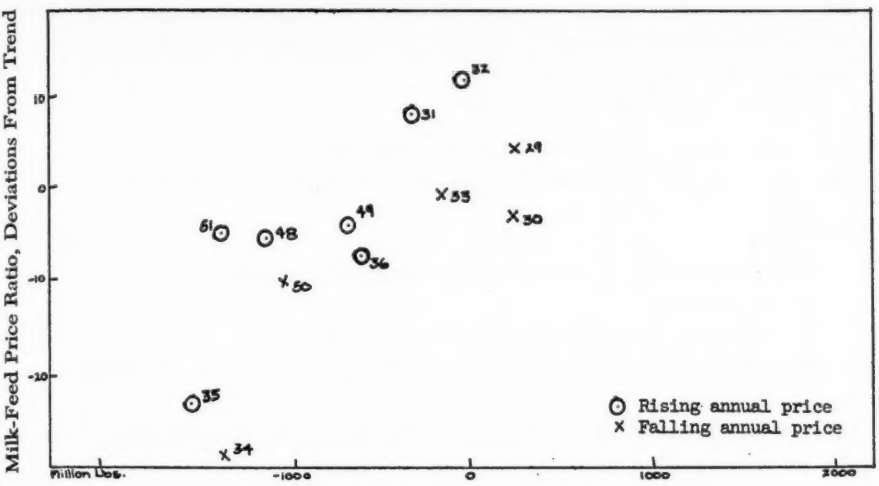


FIG. 4. ANNUAL OBSERVATIONS OF THE MILK-FEED PRICE RATIO VS. MILK PRODUCTION FOR YEARS OF FALLING PRICE TREND, LAKE STATES, 1926-58: OBSERVATIONS FOR EACH SERIES ARE DEVIATIONS FROM THE EXPONENTIAL TREND.

series. To accomplish this the output was treated as an exponential function of trend (i.e., observations of price and quantity were converted to logarithms, but observations for time were not).[7] The dots showing the observations of price and quantity represent deviations from the trend. Each dot is marked to show the year of the observation. Figure 3 contains observations for rising price trends, and figure 4 contains observations for falling price trends. Years of annual rise in the milk-feed price ratio are circled to distinguish them from years of falling price, shown by a cross.

There is indication that the highest elasticity is obtained when both the milk price trend and the annual price ratio are rising (figure 3). Unfortunately, the observations under falling price trends are limited, and whatever conclusions are reached must be accepted with some reservation.

Short run elasticities of supply were obtained for each of the four price situations using regression techniques. The quantity of milk produced was the dependent variable. Independent variables included time and the prices of milk and feed. Regressions were computed first with observations of milk and feed price expressed as a ratio, and then with milk and feed prices deflated. It was thus possible to compare the magnitudes of the coefficients for milk and feed to determine whether the

[7] For a detailed explanation of this function see Richard J. Foote, *Analytical Tools for Studying Demand and Price Structures*, USDA, Ag. Hb. 146, 1958, p. 40.

one to one relationship assumed by the price ratio was reasonable. That is, did changes in the prices of milk and feed have an equal but opposite effect on the supply of milk?

The two equations fitted were:

$$\text{(a)} \qquad \log Q = \log a + b \log P + (\log c)\, t$$

$$\text{(b)} \qquad \log Q = \log a + b_1 \log M + b_2 \log F + (\log c)\, t$$

where:

$Q$ = the quantity of milk produced in the current year
$a$ = a constant
$P$ = the milk-feed price ratio in the current year
$M$ = the price of milk deflated by the index of prices received for all farm products
$F$ = the price of feed deflated by the index of prices received for all farm products
$b_i$ = a regression coefficient
$c$ = a constant
$t$ = time: 1926 = 1

All observations except time were converted to logarithms. Not included in the analysis were variables other than time and prices of milk and feed. Addition of variables would have necessitated further subgrouping (e.g., the response of milk-feed price changes under rising and falling beef prices). This subgrouping would reduce the already small number of observations in each category. As additional variables have not been included, however, the models may be subject to specification bias.

### *Empirical Results*

Coefficients estimated by regression analysis for the various price situations previously described are presented in tables 1 and 2.[8] Since observations of milk production and prices of milk and feed were expressed in logarithms, the coefficients for milk and feed are elasticities. In table 1, regressions were computed with observations of milk and feed prices expressed as ratios. In table 2, the prices of milk and feed were each deflated by the index of prices received by farmers.

In all cases, more than 90 percent of the variance in production is

[8] The tables are organized as follows. The independent variables are identified at the top of each column. The equation number and the price situation are shown in the left-hand column of the table. To the right are columns showing the number of observations and the uncorrected $R^2$ or coefficient of linear determination for each equation. At the extreme right are the regression coefficients. Directly beneath each coefficient, in parentheses, is the standard error. The statistical $t$-value may be obtained by dividing the regression coefficient by its standard error.

TABLE 1. MILK SUPPLY ELASTICITIES, UNDER RISING AND FALLING PRICES, LAKE STATES, 1926–58: OBSERVATIONS FOR MILK AND FEED PRICES EXPRESSED AS RATIOS

| Price situation | Number of observations | $R^2$ | Time | Milk-feed price ratio |
|---|---|---|---|---|
| 1 Rising trend | 12 | .967 | .00568 | .349 |
| Rising annual | | | (.000390) | (.136) |
| 2 Rising trend | 9 | .936 | .00531 | .239 |
| Falling annual | | | (.000757) | (.108) |
| 3 Falling trend | 7 | .992 | .00447 | .134 |
| Rising annual | | | (.000346) | (.114) |
| 4 Falling trend | 5 | .990 | .00541 | .254 |
| Falling annual | | | (.000222) | (.0415) |

explained by trend alone. The importance of trend is shown by the coefficients for time, all of which are significant at the one percent level. The fact that trend accounts for such a large percentage of the variance increases the difficulty of obtaining meaningful elasticities of milk supply. Deviations from trend are comparatively small and errors of observation take on increased significance.[9]

Equations 1 and 2 and equations 5 and 6 indicate the short run supply elasticity under an environment of generally rising prices. Equations 3 and 4 and equations 7 and 8 show the short run response under generally falling prices. In equation 1, for example, the elasticity of expansion is represented by the coefficient for the milk-feed price ratio (.349). It is predicted that a one percent change in the milk-feed price ratio will be followed by a 0.349 percent rise in milk production. The corresponding elasticity of contraction is shown by the coefficient of the milk-feed price ratio in equation 2.

TABLE 2. MILK SUPPLY ELASTICITIES, UNDER RISING AND FALLING PRICES, LAKE STATES, 1926–58: MILK AND FEED PRICE DEFLATED BY THE INDEX OF PRICES RECEIVED BY FARMERS

| Price situation | Number of observations | $R^2$ | Time | Feed price deflated | Milk price deflated |
|---|---|---|---|---|---|
| 5 Rising trend | 12 | .977 | .00558 | −.306 | .369 |
| Rising annual | | | (.000347) | (.114) | (.118) |
| 6 Rising trend | 9 | .977 | .00580 | −.195 | .227 |
| Falling annual | | | (.000431) | (.0456) | (.0953) |
| 7 Falling trend | 7 | .992 | .00470 | −.127 | .116 |
| Rising annual | | | (.000511) | (.169) | (.184) |
| 8 Falling trend | 5 | .990 | .00510 | −.293 | .165 |
| Falling annual | | | (.000661) | (.0975) | (.183) |

[9] This problem is even more acute in the Northeast. An analysis similar to the one described here was conducted in this region without obtaining meaningful results. Because of the lack of profitable alternatives in the Northeast, production variance is extremely small. Under administered pricing in the fluid milksheds, price variance is also small.

Under a rising long-run price trend, the elasticity of expansion exceeds the elasticity of contraction (.349 > .239). Under a falling price trend, however, the kink is reversed (.134 < .254). Because of the small number of observations and the fact that the elasticity in equation 3 is not statistically significant, these figures must be interpreted with caution. The tenuousness of the results is emphasized by the scatter diagrams. Nevertheless, there is evidence to support these two conclusions: (1) with a rising price trend, the year-to-year elasticity of expansion exceeds the elasticity of contraction, and (2) the elasticity of expansion is higher under a rising than under a falling price trend.

The fact that the elasticities of expansion (equations 1 and 3) differ while the elasticities of contraction (equations 2 and 4) are approximately the same might be explained as follows. The rate of expansion is determined by the farmer's willingness, and more important, his ability to expand. On the other hand, the rate of contraction is principally a function of the farmer's willingness. As the results suggest, ability to expand varies widely and depends upon the long-run economic situation.

The separation of milk and feed prices in table 2 discloses an interesting relationship. In equations 5 and 6 the elasticities for milk prices are higher than for feed prices. In equations 7 and 8 the reverse is true, and feed prices become more dominant. The difference may be due in part to the psychological reaction of farmers. When the trend of milk prices is upward, producers appear to respond more strongly to changes in milk prices than to changes in feed prices. Conversely, when the trend in milk prices is downward the response to changes in feed prices appears the stronger. Thus, expressing observations of milk and feed prices as a ratio (as in table 1) may not be completely justified.

### *Conclusions*

The concept of the irreversibility of the supply function is important in the explanation and prediction of supply response. There is evidence to suggest that the supply function for milk is not reversible. The results of this study are not conclusive. Further research is needed to establish more clearly the shapes of the supply functions under different price movements. Nevertheless, the results support the contention that the elasticity of expansion under rising prices exceeds the elasticity of contraction under falling prices.

# NON-AGRICULTURAL INCOME OF LAND-CULTIVATING FAMILIES IN GERMANY

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IN THE Federal Republic of Germany, many farms are so small that they provide no sufficient means of existence to cultivators and their families. Some owners of small farms, therefore, have another main occupation. They run their farms besides their non-agricultural employment. Often most of the work has to be done by family members. Nevertheless, for these families non-agricultural employment provides the most important source for the family income.

Next comes a group of farms where agriculture provides the main source of income. Yet additional non-agricultural employment is indispensable for an acceptable standard of living. Therefore, the farmer himself or family members, living in the household, work at least from time to time somewhere else.

Generally, the smaller the farm the greater the importance of non-agricultural income. Yet it is by no means solely restricted to small farms. With increasing farm size family income will mainly be the result of farming. In these cases, non-agricultural income is of less importance for securing one's livelihood. Here the motive for non-agricultural employment is the desire to earn more or the fact that there are too many family members who cannot be employed on the farm.

In the paper to hand, income of all family members living within the family household has been added to family income. The sources drawn upon permit no other method. There is justification for doing it. If the children who obtain non-agricultural income give their parents only a small part of it for board expenses, keeping the rest for themselves, the family household will not be charged for expenditures such as clothes, pocket money, etc. There is always the possibility, too, that the parents can draw upon the children's income in case of need. The question how much of their income, if any of it, the children give to their parents can be considered as a problem of income distribution among family members, and is therefore of minor importance for our investigation, which is concerned with the total family income.

The results of different empirical investigations, made during recent years especially by the Forschungsgesellschaft für Agrarpolitik und Agrarsoziologie e.V., Bonn (Research Institute of Agricultural Policy and Rural Sociology), revealed that non-agricultural income is not a rarity with family farms. Yet up to now, there was no estimation available as to the amount and its frequency. It is welcomed, therefore, that the re-

TABLE 1. FREQUENCY OF NON-AGRICULTURAL INCOME (1956)

| Farm Size in Hectares of Total Crop-Land* | Number of Farms | Cases of Non-Agricultural Income | Cases of Non-Agricultural Income Per 100 Farms |
|---|---|---|---|
| | *Thousands* | | |
| 0.5– 2 | 551.3 | 802.2 | 145 |
| 2 – 5 | 471.4 | 586.2 | 124 |
| 5 –10 | 376.2 | 257.9 | 68 |
| 10 –20 | 262.3 | 98.2 | 37 |
| 20 and more | 126.5 | 27.2 | 22 |
| Total | 1,787.7 | 1,771.9 | 99 |

* 1 hectare is equal to about 2.47 acres.

sults of some surveys held by the Statistisches Bundesamt in 1956 have provided for the first time these details.[1]

Statistics show that, in 1956, 1,771,900 farmers or family members in Germany earned non-agricultural income. This means that, on the average, for each 100 farms 99 cases of non-agricultural income were counted (Table 1).

Non-agricultural income is of greatest importance for farms that are too small to support the whole family. Here in many cases more than one family member has non-agricultural income. But even on 37 per cent of all farms having 10 to 20 hectares—a size which is generally considered sufficient to support a family—non-agricultural income is obtained.

More than half of the non-agricultural income is received by family members; in 42.5 per cent of the cases, however, farmers themselves are involved. Non-agricultural income is mostly earned by men. Only 18 per cent of the receivers of non-agricultural income are women. Among the receivers of social income (pensions), the quota of women is 37.5 per cent, about double, a result of the many war widows. The fact that mostly men provide non-agricultural income has two main reasons. (1) On small-sized farms women often work just as efficiently as men do. Yet industry wages for men are generally higher than those for women. So it is more profitable to let men work for non-agricultural income than women. (2) Those sons who are not heirs of farms have to make their own living from a non-agricultural main occupation. Therefore, they want and must have a regular vocational education. Daughters, however, are expected to marry. There is less need for vocational training. Therefore they usually help on the farm until their marriage.

Official statistics unfortunately do not give details on the amount of

[1] Wirtschaft und Statistik, 1957, Vol. 9, pp. 219-24, and unpub. data of the Statistisches Bundesamt.

TABLE 2. ESTIMATION OF THE NON-AGRICULTURAL INCOME PER LAND-CULTIVATING FAMILY

| Farm Size in Hectares of of Total Crop-Land | Non-Agricultural Income DM/Year per Family |
|---|---|
| 0.5– 2 | 4,600 |
| 2 – 5 | 3,700 |
| 5 –10 | 1,840 |
| 10 –20 | 880 |
| 20 and more | 440 |
| Average | 2,950 |

non-agricultural income. In order to get an idea of the approximate size, we generalize here some findings of special investigations on the amount of non-agricultural income of approximately 10,000 land-cultivating families.[2] We do not have exact figures, but fair estimates which make it possible to get an idea of the magnitude (Table 2).

Average non-agricultural income per family per year amounts, according to Table 2, to DM 2,950.

The larger the farm, the lower the non-agricultural income. Families with farms of 5 to 10 hectares receive half of what is obtained in the group of 2 to 5 hectares.

Estimating on the basis of these figures the total amount of non-agricultural income which land-cultivating families in the Federal Republic of Germany receive, we obtain approximately 5 billion marks. To draw a parallel: in 1956/57, total sales of West German agriculture were 15.6 billion marks, farm expenditure amounting to 11.9 billion marks.

These figures clearly show that German farmers do not live only on agriculture. As in the USA, non-agricultural income plays an important rôle. There is a strong interrelation between agriculture and the other branches of the economy in so far as employment and income are concerned. This is certainly highly important to agrarian politics. Farm-record data which are also used in the "Grüner Bericht" provide information on the economic situation of farm enterprises, but these data will hardly be sufficient to make a statement on the living conditions of the agricultural population. In order to obtain information about the economic and social situation of the agricultural population, non-agricultural income received by farm families must be taken into account. Non-agricultural income is influencing farm economics considerably. Particularly on small farms, non-agricultural income gives farm owners the first and foremost chance to finance investments.

[2] For details refer to Frithjof Kuhnen, "Die Verbreitung nichtlandwirtschaftlicher Einkünfte bei landbewirtschaftenden Familien in der Bundesrepublik Deutschland," 2nd Cong. European Soc. for Rural Soc., Oslo, Aug. 1-6, 1960, papers and discussions.

For a correct evaluation of data about non-agricultural income it is necessary to recognize that the figures in Table 2 represent an arithmetical average. Not all farmers receive non-agricultural income, while others get much more than the average. The existence of non-agricultural income mainly depends on:

1. The desire for an additional occupation, which will be determined by the amount of income from agriculture and the economic ambition of the family.

2. The existence of suitable working places. In order to be able to run their farms, commuters object to going long distances to their off-farm jobs. Many farm operators can only take on seasonal off-farm work.

3. The existence of persons who are not necessary for running the farm. Excluding very small part-time farms, they are generally available where there are children of working age. Frequency and amount of non-agricultural income therefore vary considerably in the course of the life cycle of the family.

4. The efficient distribution of family labour between agricultural and non-agricultural employment and therefore the entrepreneurial ability of the farmer and his dependents.

These reasons for off-farm work clearly show that non-agricultural additional income is no solution for the amelioration of the economic situation of families on marginal farms. It has to be realized that in many cases non-agricultural employment of family members is only possible during the years when children are already of working age, but have not yet left their parents' home. A substantial additional income, therefore, can only be earned during one third of the time-span of a generation; during the other two thirds, the family has to live almost exclusively from the farm, which provides only a meagre living. The existence of high non-agricultural income of families on small farms is not providing a solution of the farm problem. The problem of marginal farms can only be solved by enlargement of the farm enterprise, thus changing a part-time farmer into a full-time operator, or by reducing farming definitely to a part-time job of limited size, while most of the income is derived from off-farm work. The prosperity of recent years has a great deal promoted this development.

# MECHANIZATION IN UNDERDEVELOPED COUNTRIES

OTTAR NERVIK[1] AND E. HAGHJOO[2]

THE DANGERS of rapid mechanization in underdeveloped countries have repeatedly been pointed out. Many unfortunate examples can be mentioned where tractors are not being used because repair facilities, spare parts, skilled drivers or even tractor fuel have not been available. The main dangers of rapid mechanization are: (1) The prevailing social system may be upset, and many farmers may be forced off the land before the other sectors of the economy are ready to absorb them. (2) Investments may be wasteful because the machinery is inefficiently used or even ruined because of lack of skill or because of organizational difficulties.

In spite of this, farm machinery is steadily being introduced in new areas and often welcomed by the farmers. In fact, one can often hear villagers state that their greatest need is a tractor. Some of the reasons why farm machinery is being used and accepted by the farmers will be discussed here.

## *Benefits from Mechanization*

The most useful way to discuss farm mechanization is to start with the farmers' income and the reasons why it is so low.

As the authors see it, there are three main reasons for the low income: (1) unsatisfactory land tenure relationship; (2) too small units; and (3) inefficient methods of production.

Disregarding the land tenure relationship, which is not directly connected with the following discussion, we will mention how mechanization affects the two other factors. We start with the question: "What benefits do the farmers get from mechanization?" In answering this we will confine ourselves to two common forms of mechanized operations: tractor plowing and combining.

Tractor plowing cuts down the time spent in plowing and may enable the farmer to farm more land, either irrigated or dry land. Tractors may further add to the land resources when there is land available which can be plowed up by tractor but not by oxen plows. The tractor, by plowing deeper, usually will also increase yields.

Combining may provide better recovery of grains. Another very important advantage is that it reduces the harvest time from 2-3 months to

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TABLE 1. FARM OPERATIONS IN JANUARY AND JUNE[1]

| January | June | |
|---|---|---|
| Field Crops | Field Crops | Specialty Crops |
| 1. Planting late wheat and barley (both irrigated and dryland) | 1. Irrigation: Sugarbeets 2<br>Cotton 1<br>Wheat 1 | 6. Harvesting:<br>Vegetables<br>Peas<br>Fruits |
| 2. Harvesting: sugarbeets | 2. Harvest: Wheat<br>Barley | 7. Planting:<br>Fall vegetables |
| | 3. Cultivation: Cotton<br>Sugarbeets | 8. Irrigation:<br>Vegetables<br>Fruits<br>Alfalfa |
| | 4. Plowing: Field crops | |
| | 5. Spraying: Cotton<br>Sugarbeets | |

[1] Work Programs of farmers at Shiraz, Fars Province, Iran.

1-2 weeks. This greatly reduces the risk of losses through spoilage and through weather hazards.

Still, the main benefit from tractors and combines is that the time spent in plowing and harvesting is greatly reduced, thus enabling the farmers to spend more time on other farm work. It is true that most farmers in underdeveloped countries are only partially employed; but at the critical time for most crops their time is very limited—so limited that with oxen plowing and the old system of harvesting they cannot do a good job of farming.

Two tables have been prepared. Table 1 contrasts the work program of the farmer in the critical summer months with the work program during the slack season in winter. Table 2 gives the extent of the labor requirements on a small farm with crops such as wheat, sugarbeets and cotton, and the increase in labor requirements when a small amount of an intensive crop is added.

A study of these tables will reveal how hard pressed for time the farmer is during the critical summer months. Tractors and combines would cut the plowing time from 45 days (35 in summer months) to 1 or 2 days, and harvesting time for wheat (1½ hectar) from 27 days to less than one day.[3]

Thus tractors and combines are necessary if the farmer wants to produce more intensive crops.

The authors have made some estimates comparing the cost of plowing and harvesting when tractors and combines are used and when oxen plows and hand labor are used. A further comparison is made of the income of the three-hectar farm in table 2 when a small area of a high income crop is introduced.

[3] See *Agricultural Engineers Yearbook*, 1960, p. 100.

TABLE 2. LABOR REQUIREMENTS IN DAYS FOR A 3-HECTAR FARM AT VERAMIN, NEAR TEHRAN, MAY 1 TO SEPTEMBER 1

| Operation | Alternative A[1] | Alternative B[1] |
|---|---|---|
| Plowing[2] | 35 | 35 |
| Spraying | 4 | 4 |
| *Wheat* | | |
| Irrigating | 6.75 | 4.50 |
| Harvesting[3] | 27 | 18 |
| *Cotton* | | |
| Planting | 6 | 6 |
| Irrigating | 5.25 | 5.25 |
| Cultivating | 5 | 5 |
| *Sugarbeets* | | |
| Thinning | 10 | 10 |
| Irrigating | 10.50 | 10.50 |
| Cultivating | 10 | 10 |
| *Cucumbers* | | |
| Working | — | 6 |
| Harvesting | — | 87 |
| Total | 119.50 | 201.25 |

[1] Alternative A has 1½ hectar wheat, 1 hectar sugarbeets, ½ hectar cotton. In alternative B, ½ hectar cucumbers is substituted for ½ hectar wheat.
[2] Plowing 3 times at 0.2 hectar per day. 10 days plowing done before May 1.
[3] Cutting 12, collecting 1½, threshing 9 and winnowing 4½ days for 1½ hectar.

The prevailing rate for custom operations in this area is 600 Rials[4] per hectar for plowing and 5 to 8 percent of the crop for combining, about 250-400 Rials per hectar at the usual yield and prices. Oxen plowing and hand labor when hired would cost a minimum of 60 Rials per day for plowing and 50 Rials per day for harvesting. Fifteen days at 60 Rials = 900 Rials for plowing, and 18 days at 50 Rials = 900 Rials for harvesting per hectar.

The authors have estimated the income from a three-hectar wheat, cotton and sugarbeet farm to be 31,000 Rials, as compared to 44,000 to 60,000 Rials (after the cost of fertilizer has been subtracted) if ½ hectar of cucumbers is substituted for ½ hectar of wheat in this farm.

This does not take into account the further benefits from mechanization by deeper plowing, more timely operations, better weed control, reduction in spoilage, and the possibility of farming additional land that cannot be farmed with oxen and hand labor.

Now we can come back to the objection against mechanization mentioned in the beginning of this article. The results of mechanization may not be that farmers are forced off the land. By mechanization the farmer may use his time more effectively and get a higher labor income. Total labor requirements may remain unchanged, but each hour of labor adds more to income than when oxen are used. This is one of the reasons

[4] One dollar equals 76 Rials.

why the authors believe that efforts to improve the oxen plow will do little for the farmers. Oxen plowing definitely limits the amount of land the farmers can work; and, furthermore, they cannot work effectively on their crops unless units are extremely small.

In Iran, a fairly heavy movement from the farms to the city has coincided with the introduction of farm machinery. However, it is likely that low farm incomes and rising cost of living have been the main reasons for this movement to the cities. To say it bluntly, more farmers have been displaced by oxen plows than by tractors.

It is possible that we all have been so concerned about the dangers of upsetting the social structure in the villages by mechanization that we have overlooked the perhaps greater danger to the social structure that may arise when farming is not mechanized.

It is not the intention of this article to recommend mechanization, but to suggest why mechanization is taking place and why use of tractors and combines may be advantageous to the farmers.

When mechanization is introduced, effort should be made to provide repair shops, spare parts and fuel. Even more important is the providing of good training programs for tractor drivers, truck drivers and mechanics. Such a training program should not be confined to technical subjects but should include community development principles.

A very important by-product would follow mechanization if such training programs are developed. The tractor drivers and mechanics could become the key factors in bringing new ideas to the villages. They would be more effective than village-level workers or extension agents because they would be village leaders and command respect.

## FACTORS RELATED TO LEAVING FARMING*

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IN THE last decade, the farm population of the United States has declined rapidly. In absolute terms, the farm population declined from 25,058,000 in 1950 to an estimated 21,172,000 in April, 1959.[1] In the face of a rapidly increasing total population, with the farm sector still contributing more than its share, this decline is even more significant. To put it more precisely, ". . . changes in farm population between 1950 and 1959 were the result of a natural increase of about 374,000 persons annually (excess of births over deaths) and *a net annual loss* through

* Scientific Paper 1979, Washington Agricultural Experiment Stations. Work was conducted under Project 1415.

[1] *Farm Population Estimates for 1950 to 1959*, U.S.D.A., AMS-80 (1959), Feb. 1960, p. 10.

migration and change of residence classification of *805,000*" (italicization mine).[2] These approximately 8,000,000 people, who have left farms during this past decade, do not include a shift in dependence to nonfarm income within the farm population. The number of farms declined from 4,782,162 in 1954 to 3,703,642 in 1959, a decrease of 23 per cent.[3]

This study is specifically concerned with attempting to isolate the differential aspiration of all farmers, part-time and full-time farmers, to leave their present occupation in search of a more financially remunerative position, and the relation of this factor to certain socio-economic variables. A study conducted by Fliegel in Pennsylvania used a level of aspiration index from which the items for this " level of aspiration" scale were taken.[4] In many ways, this study is a re-test of several of Fliegel's hypotheses, although the studies, except for the dependent variable, were independently conceptualized and conducted.

### A. *Sample*

A random area sample of all farms in Stevens County, Washington, was taken by dividing the non-incorporated area of the county into sampling units containing approximately ten households each.[5] These households included open-country nonfarm and farm people. The units were numbered and a 10 per cent sample was chosen, using a table of random numbers. All households in the sample units were interviewed. Of the approximately 430 households thus interviewed, 260 fitted into the 1954 Census of Agriculture definition of farm families; that is, three acres or more with an agricultural production of $150 or, if less than three acres, with agricultural sales of over $150. The data from these farms are used for this study.

Stevens County has been classified as one of the areas with a "moderate" problem of low income in agriculture in the Secretary of Agriculture's report.[6] It has been considered a marginal farming area with very little commercial agriculture: data from the 1959 Census of Agriculture indicate that 3.2 per cent of the farms are classified as Class I or II on the basis of farm sales.[7] Only 12.5 per cent of the sample and 14.7 per

[2] *Ibid.*, p. 3.

[3] *1959 Census of Agriculture–Preliminary,* U.S. Dept. Commerce, Bu. Census, Ser. AC59-1, Jan. 1961. Change of definition accounted for 232,000 of the 1,079,000 decrease in number of farms.

[4] Frederick C. Fliegel, "Aspirations of Low-Income Farmers and Their Performance and Potential for Change," *Rural Sociology,* 24:205-14, Sept. 1959. The original items were taken from Leonard Reissman, "Levels of Aspiration and Social Class," *American Sociological Review,* 18: 233-42, 1953.

[5] See W. L. Slocum and Carol L. Stone, "A Design for Area Probability Sampling," Research Notes, *Rural Sociology,* 24: 176-77, June 1959.

[6] *Development of Agricultural Human Resources,* A Report on Problems of Low Income Farmers, U.S.D.A., April, 1955.

[7] *1959 Census of Agriculture–Preliminary, Farms, Farm Characteristics, Farm Products,* U.S. Dept. Commerce, Bu. Census, Ser. AC59-1, Aug. 1960.

cent of farms in the 1959 Census reported gross farm sales of $10,000 or over.[8] About 5 per cent of the farms had a net farm income of over $5,000 in 1957. The city of Spokane is about 40 miles south and east of the border of the county and has provided some of the pull-factors in terms of urban employment. The county has only one urban area, Colville, with a population of about 4,000 in 1957.

Stevens County theoretically can be viewed as a low-income farm area and the sort of area traditionally selected in the United States to study what factors motivate and what factors impede the choice of emigration from farming. The county has lumbering and mining, but these are chronically oversupplied with labor. In a question rating several of the facilities and opportunities, about 65 per cent of the adult respondents rated job opportunities in Stevens County either as "poor" or "very unsatisfactory."[9]

### B. *Dependent Variable*

This study is concerned specifically with attempting to isolate and measure the differential aspiration of farmers to seek a better paying job. Only one question was asked with ten specific items of response: "Suppose you were offered a chance to make a lot more money than you are making now. Tell me whether these things would or would not stop you from accepting the offer. Suppose that it involved . . ."

*1. Taking on substantial debt (3)
2. Living in a big city (3)
*3. Giving up your spare time (3)
*4. Moving around the country a lot with your family (2 and 3)
*5. Leaving your community (2 and 3)
6. Leaving Stevens County (2 and 3)
7. Taking on more responsibility (2 and 3)
*8. Changing your occupation (2 and 3)
9. Endangering your health
10. Leaving your family for some time

Each item had three answer categories: (1) would stop me, (2) I'd be undecided, and (3) wouldn't matter at all. The items above are arrayed in the category order of the Guttman-type scale that was devised from these data. The cutting points of the positive responses are indicated by the numbers in parentheses—that is for item 1, "Taking on substantial debt," the positive response is (3) wouldn't matter at all, and the negative response is, by inference, (1) would stop me or (2) I'd be undecided. The items numbered 9 and 10 did not scale. The remaining

[8] *Human Resources in Stevens County—An Appraisal,* Agr. Ext. Serv., Washington State Univ., Sept. 1959, p. 183.
[9] *Ibid.,* p. 40.

eight items scaled with a coefficient of reproducibility of 90.4 per cent. The five items marked with an asterisk are similar to five of the eight items used by Fliegel, and hence it may be reasonably assumed that the items belong to the same "area of content."[10] The aspiration scale constructed for this study implicitly assumes that the farmers will leave farming. Although the assumption is not explicitly incorporated into the leading question, at least four explicit items are related to leaving farming:[11] "changing your occupation," "living in a big city," "moving around the country a lot with your family," and "leaving your family for some time."

Since eight items are used in the scale, there were nine scale ranks. The nine scale ranks were combined to form three approximately equal size categories of high, medium and low aspirants to conduct the Chi-square analysis.

In a research project in Ohio, Moore and Wayt have identified the future objectives of the farmer on a single question on the farmers' plans to continue farming full-time, part-time or leave farming.[12] This researcher has considered a single item as an unreliable and sometimes invalid method of measuring the criterion variable.

In this study, two further questions were asked to determine occupational plans. Farmers were asked whether they would accept a suitable full-time nonfarm job. A higher proportion of the high aspirants indicated that they would accept a suitable nonfarm job, and the low aspirants indicated that they would not accept a full-time nonfarm job ($X^2 = 14.953$, $p. < .001$). The farmers were also asked "Do you plan to be farming five years from now?" The answer categories were "yes, full-time," "yes, part-time," "no," and "don't know." Contrary to logical expectations, a higher proportion of the high aspirants seemed to indicate that they would be farming full-time five years from now, but the differences were not statistically significant, ($X^2 = 6.682$, probability between 10 and 20 per cent).

In short, in this paper, level of aspiration is a measure of a farmer's desire to seek a better paying job: those dissatisfied with their present situation would be highly motivated and tend to allow fewer things to stand in their way. In this society, with its philosophy of eternal progress, the mobility of labor to seek better paying jobs has become the norm: not only is the nonfarm population expected to move, but this has been ascribed as the motivating pull-factor for farmers to leave farming.

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[10] The "trace line" analysis developed by James H. Copp and used by Fliegel achieves approximately the same result as the Guttman-type scale.

[11] The association between "changing your occupation" and the scale is highly significant (see Table 1). This single item was used in place of the dependent variable to test the association with other independent variables; the associations were similar to those using the scale.

[12] H. R. Moore and W. A. Wayt, *The Part-Time Route to Full-Time Farming*, Ohio Agr. Expt. Sta., Res. Bul. 793, Wooster, Sept. 1957, p. 7.

### C. *Independent Factors*

#### 1. *Farm performance and level of aspiration*

The general assumption that is made, particularly by farm economists, is that successful farmers will not aspire to leave farming whereas poor or inefficient farmers will be forced to leave farming. The research hypothesis being tested here is that there is an inverse relationship between success in farming and an aspiration to leave farming.

Five different measures were used to test this hypothesis. First, *gross farm sales* were cross-tabulated with level of aspiration. No significant association was found between gross farm sales and level of aspiration. Second, another measure of size—*productive-man-work-units*—was cross-tabulated with level of aspiration. No association was found between productive-man-work-units and level of aspiration. Third, perhaps the most discriminating measure of farm success, *net farm income*, was cross-tabulated with level of aspiration. (In this study, net farm income was measured as a difference between gross farm sales and total farm expenditures.) It was found that the differences shown could occur by chance in between 90 and 95 per cent of such cases. Fourth, perhaps the most stable measure of success on the farm, *net worth*, was cross-tabulated with level of aspiration; again, no significant association was found. Finally, the fifth measure of performance as a farmer was the amount of information he sought from an agency like the Agricultural Extension Service. The *extension contacts score*[13] computed for each farmer was cross-tabulated with level of aspiration. The differences found were not significant.

#### 2. *Socio-economic and background factors*

The general hypothesis being tested was that level of aspiration would be related to certain socio-economic and general background factors. More specifically, the research hypotheses were (a) level of aspiration would be inversely related to *age* and *mobility*, and (b) level of aspiration would be directly related to socio-economic status as measured by *education, level of living*, or *family income.*

A Chi-square test was applied to see if the high, medium and low aspiration groups differed with respect to *age* (Table 1). It was found that both husbands and wives among the high aspirants were consistently of the younger age groups. Somewhat related to the factor of age is mobility. A test was applied to see if the three aspiration groups differed with respect to the *years they had spent in farming* and the *years they had spent on this farm* that they were living on at present. In both cases,

[13] This extension contact score was computed by differentially scoring several types of contacts with the extension service. See W. L. Slocum, Owen L. Brough and Murray A. Straus, *Extension Contacts, Selected Characteristics, Practices and Attitudes of Washington Farm Families*, Wash. Agr. Expt. Sta. Bul. 584, Pullman, Apr. 1954, p. 2.

TABLE 1. SUMMARY OF CHI-SQUARE TESTS OF ASSOCIATION BETWEEN LEVEL OF ASPIRATION AND THE INDEPENDENT VARIABLES

| Variable | Chi-square | d.f. | Probability | $\overline{C}$ and Direction |
|---|---|---|---|---|
| 1. *Background and socio-economic factors:* | | | | |
| Age of operator | 9.945* | 4 | .05 | −.19 |
| Age of wife | 14.465* | 6 | .05 | −.24 |
| Years on this farm | 8.878 | 6 | .05–.10 | −.18 |
| Years in farming | 18.780* | 6 | .02 | −.24 |
| Years of school, husband | 5.867 | 6 | .30–.50 | |
| Years of school, wife | 7.100 | 6 | .30–.50 | |
| Total family income | 7.722 | 8 | .30–.50 | |
| Level of living | 3.398 | 6 | .70–.80 | |
| 2. *Farm performance:* | | | | |
| Gross farm sales | 10.146 | 10 | .30–.50 | |
| Productive-man-work-units | 4.655 | 6 | .70–.80 | |
| Net farm income | 0.669 | 4 | .90–.95 | |
| Net worth | 5.498 | 6 | .30–.50 | |
| Extension contact score | 6.625 | 4 | .10–.20 | |
| 3. *Nonfarm occupational associations:* | | | | |
| Operator's father in farming | .025 | 2 | .95–.98 | |
| Wife's father in farming | 3.126 | 2 | .20–.30 | |
| Brothers in farming | 7.248 | 4 | .10–.20 | |
| Brothers in other occupations | 4.423 | 4 | .30–.50 | |
| Number of nonfarm jobs | 6.653 | 6 | .30–.50 | |
| Number of additional skills | 3.036 | 4 | .50–.70 | |
| Wife employed | 2.056 | 2 | .30–.50 | |
| Nonfarm income | 4.957 | 4 | .20–.30 | |
| 4. *Factors contingent on dependent variable:* | | | | |
| Would accept full-time nonfarm job | 14.953* | 2 | .001 | +.236 |
| Farming plans five years hence | 6.682 | 4 | .10–.20 | |
| Would change occupation | 48.716* | 4 | .001 | +.414 |

* Statistically significant at less than .05 level.

the high aspirants seemed to be the ones who had spent fewer years in farming, or on their present farm. The associations were statistically significant for the former but not significant for the latter.

Three socio-economic factors were cross-tabulated with level of aspiration to test the associations. It was found that *years of school* completed by the husband or by the wife was not significantly associated with levels of aspiration. Nor was *total family income* or the *level of living index* associated with the level of aspiration scale. These latter two tests support the findings of Fliegel in Pennsylvania. Hence, socio-economic status was not related to level of aspiration. In other words, the farmers of this sample with high aspiration to get a better job come from all levels of socio-economic status.[14]

### 3. *Nonfarm occupational affiliations*

The third general hypothesis tested was that parental and sibling, past and present nonfarm occupational associations would tend to be related to the aspiration to leave farming. In other words, if a farm operator's

[14] See also J. R. Bowring and O. B. Durgin, *The Population of New Hampshire, 4. Factors Influencing the Attitudes of Farmers Towards Migration Off Farms,* N.H. Agr. Expt. Sta. Bul. 458, Durham.

father or his wife's father or any of his brothers were in other occupations, this should tend to encourage his aspiration to leave farming. If he himself has also worked in nonfarm occupations, or has some nonfarm skills with which he could make a living, these would tend to increase his aspiration to leave farming.

Questions were asked to determine the *occupation of the operator's father* and the *operator's wife's father*. It was found that 81 per cent of the operators' fathers and 55 per cent of the wives' fathers were in farming. It was hypothesized that the father's being in farming would tend to be an inertia-factor related to low aspiration; or vice versa, if the parents were in non-farm occupations, this would act as a pull-factor related to high aspiration. Neither of these two factors was associated with level of aspiration.

Second, the number of *brothers that were in farming* may tend to act as an inertia-factor, and the number of *brothers in other occupations* may tend to act as an independent pull-factor away from farming. These variables were cross-tabulated with level of aspiration, but the tests did not show any significant associations.

Third, the *number of nonfarm jobs* that the farm operator had worked in for more than six months was cross-tabulated with level of aspiration and no significant associations were found.

Fourth, in addition to the jobs the farm operators had held, particularly during the war, a farmer has been considered a jack-of-all-trades in that he has to develop many skills to keep a farm in operation. Therefore, another question was asked to determine the *number of additional occupational skills* with which the farm operator felt he could earn a living. This variable was cross-tabulated with level of aspiration, but no association was found.

Fifth, it was hypothesized that if the *wife was working* in a nonfarm occupation, this would tend to influence the husband's aspiration to leave farming. Only about 12 per cent of the farm wives were found to be working and there was no association between this variable and level of aspiration.

Finally, it was thought that a major economic factor pulling a farmer away from farming would be his *nonfarm earnings*. Nonfarm earnings were cross-tabulated with level of aspiration and no significant associations were found.

From these data, the general hypothesis that nonfarm job associations would be related to a high aspiration to leave farming can be rejected.

### *Conclusions*

The results of this study of Stevens County, Washington, support most of the empirical findings of Fliegel in Fayette County, Pennsylvania, in spite of the fact that the Pennsylvania samples consisted of commercial

farmers whereas the Washington sample included all farmers in the county.

(1) The dependent variable termed "level of aspiration" seemed to demonstrate unidimensionality as manifested by the Guttman scaling technique and seemed to be similar to that used by Fliegel.

(2) Level of aspiration was not related to any of the five measures used for performance on the farm.

(3) Inverse associations were found between level of aspiration and age, and level of aspiration and years in farming. These associations are quite logical in that the older a person gets or the longer he works in one occupation, the less would he want to leave and seek his fortune elsewhere.

(4) Education, family income and level of living were not related to level of aspiration.

(5) No association was found between level of aspiration and the number of nonfarm jobs the operator had worked in, nor the number of additional skills he had from which he felt he could make a living. Further, the fact that the operator's father or his wife's father was in farming, or that he had brothers in farming or in other occupations, or even that his wife worked in a nonfarm occupation, did not seem to push or pull his own aspiration to leave farming. Even the amount of nonfarm family earnings did not seem to affect his aspiration to leave farming: Fliegel found an association with off-farm earnings.

### *Discussion*

The major inference from the negative results of this study is that the chronically low income agricultural areas like Stevens County, Washington, or Fayette County, Pennsylvania, are not good areas to theoretically study factors related to level of aspiration in the American farm culture. Historically, many intervening factors peculiar to each of these areas and the individuals living in these areas inhibit the normal manifestations of differential levels of aspiration. Therefore, these areas must be treated as regions of chronically low aspirants. The logical economic and social factors that may be related to level of aspiration at higher levels are not necessarily operative among low aspirants.

Perhaps the selecting of chronically low-income areas of a state which constitute the Rural Development counties may have some bearing on these results. In Stevens County, between the 1950 Census and the time the sample was taken in 1958, there seemed to be a substantial emigration in the 20-to-39-year age groups.[15] Coupled with this is the expressed opinion of the poor job situation in the county. Apparently, the people

[15] See Prodipto Roy, "The Occupational Experience and Job Situation in Stevens County: Spring, 1958," in *Human Resources in Stevens County—An Appraisal*, Washington State Univ., Sept. 1959, p. 41.

remaining, owing to certain social or psychological reasons, or economic conditions, have decided to remain in spite of the poor situation. Or, in other words, the people in this survey constitute the low end of the aspiration scale (the people on the high end have already migrated) and the variance being analyzed in level of aspiration only consists of the low aspirants.

Among these people it is possible that the nonfarm job associations of their own, their parents or their siblings were not fortunate. They may be farming for various non-rational and highly individual reasons; e.g., love of the countryside or because they like the fishing and hunting, or a host of similar personal reasons. The research results indicate that the aspiration to leave farming for people in chronically low-income counties does not fit the expected economic and sociological patterns.

## IMPLICATIONS OF CHANGES IN MARKET STRUCTURE ON EXTENSION MARKETING PROGRAMS AND ADMINISTRATION

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CHANGES in the structure of agricultural and related markets should have a profound impact on traditional extension marketing programs, organization, and administration. In this paper, some modifications required in the light of structural changes in agricultural markets will be identified and analyzed.

Many marketing problems of farmers stem largely from their individual inability to respond effectively to changes in market structure. However, farmers through cooperatives can adjust to, modify, or counteract changes in market structure as a means of improving their bargaining position. It is the thesis of this paper that extension programs need to be modified to better help farmers make timely adjustments involving group action. This requires improved extension programs in market news, economic information and outlook, for firms as well as farmers, and new programs to facilitate acceptance of improved methods of decision making by directors and managers of agricultural marketing firms. In addition, the means and media of communication used in economic programs need to be changed for greater effectiveness.

### *Market structure factors*

Market structure refers to the number of buyers or sellers for a commodity in a marketing area, their size in relation to each other, the extent of product differentiation, the ease of entry of new firms which

affects the ability of firms to exercise some degree of market control, the nature of price determination, and the nature and types of competition in existence.

With such elements, market structure is defined as the institutional framework through which interaction occurs between and among buyers, and between buyers and sellers. The outcome of this interaction is dependent to a large part on the structural framework in existence. Expressed differently, the performance of agricultural markets is governed largely by market structure criteria.

## I. *Development of Extension Marketing Education*

Extension programs in marketing, as other phases of extension programs, are authorized by Smith-Lever legislation. In fact, sponsors of this Act expected extension workers to devote as much attention to economic problems of farmers as they did to production phases.[1]

Apparently, there was relatively little marketing education during the formative years of the cooperative extension service. Much of the marketing education program consisted of providing economic information and outlook. Programs in farm management were, however, more common.[2]

During the 1920's, extension marketing programs were directed at helping farmers adjust to and modify market structures facing them. Emphasis was placed on organizing processing and marketing cooperatives to help farmers develop better markets, to receive larger shares of consumers' expenditures for food by performing some marketing functions, and to offset in varying degrees the large-scale buying and selling organizations developing at that time.

Technological advances in communications, transportation, refrigeration, and processing, and the effects of the depression of the 1930's on farmers' income brought a shift in emphasis of extension marketing education. During this period, programs were aimed at increasing marketing efficiency, understanding of the channels of marketing and the services or functions performed, and the use of governmental powers and finances to assist farmers to adjust production to demand at a more favorable price level. Emphasis was also placed on assisting farmers with problems of assembling, grading, packing, handling, storing, transporting and distributing farm products. Extension marketing activities were largely directed to the farm level, and until recently have remained at this level.

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[1] Raymond C. Scott, "A Critical Appraisal of Agricultural Marketing Extension Education," *J. Farm Econ.*, 39:1611, Dec. 1957.

[2] See H. C. Taylor, *The Story of Agricultural Economics*, Iowa State College Press, 1952.

## II. *Recent Trends in Extension Marketing Education*

However, there has been increasing recognition that extension can advantageously serve other groups as well as farmers. The Agricultural Marketing Act of 1946 stimulated an expansion in marketing educational work by providing matching funds to states to develop new marketing programs.[3] And, for the first time, clear intention was given for expanding marketing programs with firms and consumers.

### *Work with marketing firms*

Educational programs are increasingly being undertaken with marketing firms: processors, marketing agencies, wholesale and retail distributors, and transportation agencies. The programs are designed to help managements of such firms to become more effective.

These programs recognize that processing and marketing services provide an increasing share of the value embodied in farm products as they reach consumers. With about 65 per cent of the consumers' dollar spent for food going to off-farm firms, there are important opportunities for improvements in methods, handling, and general efficiency of marketing operations. As Scott has stated,

> There seems to be a growing acceptance of the idea that agriculture and agricultural related business are becoming so interrelated that in many of our activities we must work with more than one segment if our work with any one segment is to be most successful.[4]

The benefits to farmers or consumers from educational activities with marketing firms may be greater than from many of those carried on directly with farmers.

Important changes in market structures since World War II have altered the relationships between farmers and those to whom they sell. These changes have occurred swiftly at times, with little recognition of the existence and extent of change by farmers and those who work with them. Extension marketing educators, it seems, must be included. But failure to recognize that changes have occurred, and continue to, is failure to face reality.

## III. *Changes in Marketing Structures*

Market structures are in a state of constant flux, but generally in the direction of fewer firms facing producers. For example, in 1957 there were 75 processing firms in Wisconsin who bought vegetables for process-

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[3] Combined with state funds, total AMA marketing funds increased from $344,030 in 1948 to $3,241,306 in 1957.

[4] Raymond C. Scott, "Improving Our Marketing I.Q., Philosophy and Goals of Cooperative Extension Marketing Programs," *Proc. Assoc. Southern Agric. Workers*, 1958, p. 179.

ing from growers. In 1930, there were 141 companies.[5] In dairy products, the eight largest companies in the nation in 1954 manufactured 52 per cent of the concentrated milk, 30 per cent of natural cheese, and 24 per cent of the butter. The eight largest firms accounted for 55 per cent of the nation's pack of frozen fruits and vegetables, 52 per cent of the flour and meal and 96 per cent of beet sugar refining.[6] The situation is similar for other commodities.

A direct consequence of increased concentration in agricultural markets is that individually, farmers have little or no bargaining power in their relations with buyers of their products. A related effect is a gradual erosion of the effectiveness of farmer cooperatives, which have failed to expand as rapidly as non-cooperative enterprises.[7]

This leaves cooperatives often less able to provide needed services effectively for members relative to proprietary marketing firms. Meanwhile, increased concentration in grocery retailing, increased vertical integration into manufacturing by large scale chain grocery retailers,[8] and their effective development of private labels places small processors, including marketing cooperatives, at a distinct competitive disadvantage when selling to large chain buyers. In fact, as a result, many marketing cooperatives now have less market power than ever before and, therefore, less effectiveness in price formulation for products they sell.

*Management oriented programs*

Extension marketing programs should assist cooperative members and management to identify the important changes in marketing and market structure affecting them, and to develop criteria to help in finding solutions. Secondly, progressive cooperative managers recognize the complexity of industrial organization and management—even in relatively small-sized agricultural businesses—which restrict their effectiveness. Such managers are interested in improving their managerial capacities, and extension is the logical agency to conduct such educational programs. But, extension itself will need to tool itself effectively for the task.

It is well to also consider expanding educational programs in economics to directors of farmer cooperatives too. These policy formulators are in a strategic position in determining the destiny of cooperatives. Educational

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[5] Leon Garoian and W. F. Mueller, *Wisconsin Canning Crop Statistics,* Dept. Agr. Econ., Univ. of Wis., Feb. 1958, p. 20.

[6] *Concentration in American Industry,* Report of Subcommittee on Antitrust and Monopoly to the Committee on the Judiciary, U.S. Senate, 85th Cong., First Sess., 1957, Table 42, pp. 196-97.

[7] Willard F. Mueller, *The Role of Mergers in the Growth of Agricultural Cooperatives,* Bul. 777, Calif. Agr. Expt. Sta., Feb. 1961.

[8] See Willard F. Mueller and Leon Garoian, *Changes in the Market Structure of Grocery Retailing, 1940-58,* Res. Rept. 5, Univ. Wis., Madison, Apr. 1960.

programs are needed to help directors clarify the important services to be provided by cooperatives, and to develop criteria on how farmer-directors can function most effectively to help cooperatives to reach realistic objectives.

Farmers are, of course, trying to adjust to changes in market structure. Adjustments are being made through horizontal expansion of farmer's cooperatives, and in producers' bargaining associations, notably in dairying and fruit areas. But the need for continuation and expansion in these directions poses real opportunities for educational work in extension marketing.

The foregoing implies that problems of changing market structures manifest themselves on cooperatives more than with proprietary firms. Actually, small marketing firms producing undifferentiated products, and in small volumes, face essentially the same problems as do cooperatives in selling to large scale buyers.

Increasing concentration in the markets to which farmers sell their products is not the only important change. The extension of decision making and control from the firm level down to the farm, via vertical integration, raises problems in the conduct of educational programs. Many of the decisions traditionally made at the farm level, with which extension has been of help, are now made at the firm level instead. Many of these decisions are expressed in contractual arrangements between the firm and the farmer. Thus, extension may need to work through different, and often several channels to get acceptance of new research results when previously a single channel to the farm level sufficed.

The changes resulting from vertical integration, and their effects, manifest themselves also in the communication media used by extension. On this point, R. L. Kohls has stated the nature of the problem well:

> . . . we are still largely using experiment station and U.S.D.A. bulletins and leaflets as our main source of communication . . . they might be quite adequate if those whom we were trying to reach were ourselves or farmers who have been acclimated to these sources. But much of our information is now supposedly of value to retailers, processors, handlers, etc. These groups have their own professional press in the form of trade magazines. The response to the research information placed in the right communications channel is often-times amazing.[9]

Extension marketing personnel may find such trade journals important means of reaching new clientele as the scope of their activities expand.

*Re-orienting Outlook*

Dissemination of outlook information is another area in which critical re-appraisal is warranted. With fewer alternative outlets available due to

[9] R. L. Kohls, "A Critical Evaluation of Agricultural Marketing Research," *J. Farm Econ.*, 39:1603, Dec. 1957.

the reduction in numbers of marketing and processing firms, and increased mechanization for specialized production which reduces production alternatives, farmers may need a different type of outlook information. With increasingly more decisions being made at the firm level, it is appropriate to consider a change in orientation of market outlook information for some commodities from the farm to the firm. If contractual arrangements which specify prices to be paid farmers increase in the future, it may be that outlook information will be more useful instead in helping firms to analyze the markets for their products. Meanwhile, farm outlook will continue to be of value, but more from a farm management view than a market orientation.

Even in such traditionally accepted educational activities as grading and packing, extension's usual contributions may be challenged—or become increasingly useless—as buyers require grading and packaging to their specifications. These may differ from those customarily used by growers and the trade in general. There is little factual information on the extent of specification buying in various farm products, and clarification of extension's educational role in light of it must await more knowledge.

*New programs in sampling*

Meanwhile, extension can make worthwhile contributions by developing programs centered around statistical sampling procedures. The objectives of such programs would be to increase the efficiency of (1) equity of processors' payments to farmers, and (2) decisions relating to processing plant operations.

Many farm products are purchased by processors on the basis of sampling. In many cases this has led to friction between the two parties because of a lack of knowledge of the requirements for an efficient sampling procedure. A program designed to increase understanding in this area would do much to improve grower-processor relationships.

This program can be expanded to also assist management in making more efficient decisions relative to inter- and intra-seasonal plant operations. Sampling procedures to accomplish the first objective could be used to facilitate, at least in part, the second. One example of the use of sampling procedures for this purpose is the case where raw products are received which have a wide range in the size of the commodity. The results of sampling can be used as the basis for blending various lots to obtain near capacity utilization of in-plant flow of product.

The academic background of a specialist conducting such a program would require good training in statistics. Most agricultural economists with a statistics minor would have sufficient training for such a program.

With expansion of work with marketing and processing firms, and with

producer groups seeking to find a better adjustment to market conditions, extension economists may often find it necessary and desirable to engage in some applied research to guide the group being served. Actually, engaging in applied research by extension workers is not much different than their use of textbooks to find answers to problems. It simply needs to be viewed as an extension tool which applies techniques previously developed and tested by researchers.

To effectively work in the newer areas, it seems logical to expect new tools and methods will need to be employed. Such tools may be linear programming and game theory applied to problems of firms. Extension marketing economists will need a better understanding of the rich body of economic theory of imperfect markets. But as compelling will be the proper administrative environment which will permit extension personnel to fulfill their obligations properly. This may be difficult to achieve in some instances.

## IV. *Administrative Considerations*

In the following discussion, an attempt is made to make explicit some administrative considerations considered necessary to relate marketing programs to changes in market structure.

The objectives of an extension marketing program must be acceptable to administrators for continued support. But clearly stated and accepted objectives are only a part of the means by which Extension's educational marketing programs are developed and maintained. Extension administrators need to recognize and give attention to problems and opportunities in marketing to most effectively serve the public. Any changes in programs, in objectives, in allocation of resources, or in clientele served need to be thoroughly analyzed in terms of effects on the overall extension program, new personnel qualifications, budgets, in-service training, areas of responsibility and the commensurate authority, and existing personnel.

Training in business management seems essential for marketing personnel working with marketing firms. In fact, it may be more desirable than a degree in agricultural economics for certain new types of extension marketing work. For most extension marketing programs discussed, however, sound training in economics should be a requirement.

Changes in relationships between farmers and marketing and processing firms "call for a clearer understanding and a better appreciation of basic economic principles underlying the agricultural industries. . . . Theory of value concerning prices of factors of production and of agricultural commodities at different levels in the marketing channels calls for more study of supply and demand schedules, imperfect competition, and indifference contours."[10] It requires that extension marketing econo-

[10] Tyrus R. Timm, "The New Agriculture—A Challenge in Relationships," *Proc. Assoc. Southern Agr. Workers,* 1958.

mists understand the theoretical framework within which researchers analyze marketing problems. But, in addition, it may mean some applied research at the firm level by extension personnel as previously mentioned.

In expanding the educational marketing program, a complete analysis of the marketing needs of the people to be served is needed. Without such a complete audit, it is difficult to objectively allocate personnel to areas of work which would maximize their efforts and contributions. Auditing of needs will contribute much more than merely to determine areas to be served. It should be the basis by which administrators determine the type of personnel required and should be a prerequisite to the recruitment program.

A full analysis of marketing needs of the state makes possible shifts in emphasis from less important areas to those with higher priorities. Implicit, furthermore, is the recognition that adjustments in assignments of marketing personnel may be required to facilitate a shift in emphasis. However, personnel must have freedom to develop programs with their clientele with a minimum of program direction from extension administrators and advisory committees that are not qualified in the specific area of marketing.[11]

Consideration needs also to be given to the geographic boundaries where projects are to be conducted. Often, marketing areas do not correspond to political boundaries, requiring administrative sanctions to develop regional programs where necessary.

Marketing specialists' responsibilities to county workers may require reappraisal by administrators, since the traditional role of specialists as disseminators of information to county agents and specialists' participation in farm visits or meetings with groups of farmers may hamper effective work. County agents are often not in close contact with marketing firms, and educational programs may be restricted by close adherence to the traditional concept of the roles of specialists within the extension organization. Direct contacts by marketing specialists with firms is required. Completely ignoring county workers is not justified, however, since with many marketing problems originating from market structure, county extension workers can and should be expected to contribute. At all times, it seems wise for extension marketing personnel to keep county extension workers fully informed on the nature of work being conducted in the county.

*Coordination required*

The different nature of marketing problems from those of production needs to be recognized by those having administrative responsibilities.

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[11] Wendell Earle and Jean Evans, "A Critical Look at Extension Marketing Programs," *Proc. Assoc. Southern Agr. Workers,* 1958, p. 180.

Marketing, perhaps more than other extension fields, often involves a number of disciplines for thorough analysis, since problems may involve not only economics, but production and technological sciences as well. Clearly then, a team approach to some marketing problems should be carried out, in order to bring to bear, on a unified program, an integrated fund of scientific knowledge. In the marketing of horticultural crops, such a team may include personnel from horticulture, plant pathology, agricultural engineering, food technology and agricultural economics.

The variety of problems, just discussed, that arise in expansion of extension marketing programs, suggest the need for establishing a marketing coordinator. Two types of coordination are necessary. One may be called internal, consisting of program and personnel relationships within the marketing economics group, and between this group and research personnel. Of particular importance in this respect would be the development of program priorities by the entire marketing group in line with available resources. Budgets, programs, reports, evaluation, and other factors would be included within this type of internal coordination.

A second type may be called external, consisting of coordination of programs, personnel, and projects of an inter-disciplinary nature for specific problems. As such, the coordinator would be concerned with conferring with staff from the appropriate departments to prepare project plans, to assist in setting objectives and goals, budget preparation, evaluation of the program, and to assist in bringing about the successful completion of marketing projects.

Closely related to both types of coordination is that of development of in-service training in marketing for county extension workers in cooperation with extension district supervisors. Continuous in-service and professional training is essential for a staff to be competent in interpreting new developments in subject matter, teaching methods, procedures, and in keeping various publics informed. Carrying the general objectives of the extension marketing program out to the counties, for the understanding of county workers, would be an important function of a marketing coordinator. Such training may lead to more effective marketing work at the local level with producers, if needed, and to increased awareness of needed work with firms through effective program determination for specific marketing programs and projects at local levels.

Obviously, the coordinator should be adequately trained in economics for two reasons: (1) to draw forth maximum contributions from marketing economists, and (2) because economic aspects of marketing are normally focal points of inter-disciplinary marketing programs.

A final unresolved administrative issue emerges. Can extension develop close working relations with marketing firms while continuing emphasis along commodity lines?

Observation suggests marketing firms respond better to an extension marketing program operated along a functional, rather than a commodity orientation. This seems logical, in view of the functional organization of most marketing firms. But a more important reason for shifting to a functional approach for extension marketing programs is to enable personnel to develop expertness in specific functions, as transportation, finance, organization, and internal plant efficiency, to meet specific needs of firms.

With a commodity orientation, personnel tend to develop a degree of broadness in program with a minimum of depth. With a functional orientation, personnel lose some aspects of a broad sweep, but instead emerge as authorities in certain specified functions. The latter is important if extension is to make important contributions to its newer clientele.

Administratively, support for marketing programs has evolved from farm groups along commodity lines. For practical purposes, it may be necessary to consider adjustments in orientation in stages, to maintain farmer support, while making sufficient contributions to firms to elicit their support for funds.

Extension marketing seems destined for exciting growth. The degree to which extension programs bring about important results will be governed by the quality and training of personnel and their vision, and the amount of administrative imagination supporting the marketing programs.

## EFFECT OF AIR FREIGHT RATES ON CUT FLOWER SALES

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### *Introduction*

SALES of California flowers in-state increased 58.2 percent from 1950 to 1958. Out-of-state sales, however, increased only slightly during the same period and, as a percentage of total flower crop, they declined.

At a recent conference, cut flower growers and shippers in southern California maintained (1) that transportation rates have played a major role in the failure of their out-of-state market to keep pace with the intra-state market, and (2) that shipping losses are often excessive because mail takes precedence over flowers in allocation of cargo space. Significantly, none of the growers and shippers expressed concern over packaging and other costs connected with flower shipments.

A lack of reliable data was a distinct handicap in analyzing the in-

dustry problem. Nevertheless, at least a cursory examination seems possible of how air transport rates and regulations are related to the decline in out-of-state shipments of cut flowers from southern California. Therefore, the authors have attempted a brief analysis of the probable effects of air freight rates and regulations on the volume of flower sales to out-of-state markets.

*Present Rates*

In approving minimum air freight rates for all commodities the Civil Aeronautics Board has recognized a twofold obligation of improving the carriers' net revenue and encouraging the growth of various industries. This was equally true when it approved minimum rates for cut flowers.

Rate making is a complicated procedure. It brings into focus the adequacy of the carriers' formulas for allocating costs between passenger services and commodities and among commodities. It also places the Board in a position of judging the probable impact of proposed carrier rates on the users of such services. Both issues faced the Board in approving the rates on flowers, a business for which neither the Board nor the carriers had an adequate statistical basis for a decision. Having reached a decision based on the meager facts available, the Board left an opening for a questioning of the equity of the rate structure. In particular, growers and shippers would be likely to claim that lower rates would tend to lower selling prices in out-of-state markets and stimulate demand.

Now let us examine existing rates for cut flowers.

In 1948 the Civil Aeronautics Board prescribed the lawful minimum rates for transporting of property by air, of 16 cents per ton mile (one ton hauled one mile) for the first one thousand ton miles in any one shipment and 13 cents per ton mile for all ton miles in excess thereof. In 1950 the Civil Aeronautics Board reported in Order Number E-4048 that a directional imbalance of air cargo movements resulted in low load factors in the backhaul, a consequent loss of revenue, and a restrictive effect on the development of traffic in the dominant easterly and northerly directions. To assist carriers to increase their backhaul traffic, the Civil Aeronautics Board modified its minimum rate order to provide below-minimum rates for long haul shipments in the dominant directions, based upon percentages of the minimum rates. These minimum rates were made applicable to cut flowers. The 1948 order was modified again in 1953 by increasing the respective minimum rates to 20 and 16.25 cents per ton mile. In 1955, the Board issued Order Number E-9114, setting respective rates of 16 and 13 cents per ton mile for cut flowers moving from any point in any state on the Pacific Coast to any point in

any other state or the District of Columbia that is north of the 37th parallel (roughly a line from San Francisco to Washington, D.C.).

Thus, present legal minimum air freight rates on cut flowers are basically the same as those in existence in 1948. Rates of the Railway Express Agency, however, were increased on nine occasions during the same period. The amount of increase in the Chicago rate from January 22, 1948, to date is 36.4 percent; New York, 33.7 percent; Dallas, 41 percent. In fact, Railway Express Agency rates are higher than air freight rates to both New York and Chicago.[1]

Rates are not available on cut flowers transported by motor carrier. Cut flowers are considered a horicultural commodity; therefore, they are entitled to the agricultural exemption from the provision of Part 2 of the Interstate Commerce Act. The rate charged for motor transportation varies from transaction to transaction.

### *Risk*

According to a common rule in rate making, articles that are perishable move at higher rates than less perishable articles, other things being equal. The high perishability of flowers requires special handling that increases costs, besides resulting in relatively high losses. Although the liability of air carriers is limited to 50 cents per pound,[2] losses range from 3.31 to 4.91 percent of total revenue derived from carriage of flowers by air. This compares to about one percent for all other commodities.

### *Revenue Comparisons*

Table 1 shows estimated revenues derived by air carriers from flower shipments to major markets. These revenues were below the average on all freight on a ton mile basis. All air carriers derived a simple average of 17.75 cents per ton mile from shipments of flowers to major markets. This compares to the average revenue of Domestic Trunk air carriers on all freight of 21.87 cents per ton mile in 1957 and a five year average of 22.43 cents, as reported by the Civil Aeronautics Board in 1957. All Cargo Carriers received an average of 17.83 cents in 1957 with a five year average of 16.93 cents, which is about equal to the returns from the shipment of flowers. The All Cargo Carrier group, however, accounted for a relatively small portion of total flower shipments.

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[1] Railway Express Agency rates on cut flowers from Los Angeles in effect since September 1, 1959: to Chicago, $16.89; to New York, $20.73; to Dallas, $13.11. The respective air freight rates are $14.20, $19.65, and $13.45. All rates per 100 pounds.

[2] Unless a higher value is declared on the air bill at the time of receipt of the shipment from shipper, $50 value is assumed. If higher value is declared the charge of 10 cents per 100 dollars of declared value is made. See: *Official Air Freight Rules Tariff No. 1-A*, CAB No. 13, Rule 4.3.

TABLE 1. TON-MILE CHARGES ON AIR SHIPMENTS OF FLOWERS FROM LOS ANGELES TO MAJOR MARKETS

| Major markets | Flowers (cents per ton-mile) | Major markets | Flowers (cents per ton-mile) |
|---|---|---|---|
| Boston | 16.02 | Kansas City | 17.70 |
| Chicago | 16.28 | Memphis | 21.75 |
| Cleveland | 16.01 | New York | 16.03 |
| Dallas | 21.69 | Philadelphia | 16.04 |
| Detroit | 16.24 | St. Louis | 16.68 |
| Houston | 22.56 | Washington | 16.00 |

Source: Computed from rates obtained from airlines as of July 1959.

The relative importance of southern California in the State's cut flower production has declined even though it has lower air freight rates than northern California. In 1958, the value of cut flowers in southern California, as measured by sales volume, was 9.1 percent below the 1950 volume. The average for the last six years is about ten percent below the 1950 volume. By contrast, production in 1958 in the San Francisco Bay area was 66.5 percent above 1950 volume. Thus, factors other than transport rates might be responsible for the relative decline in importance of out-of-state sales from southern California.

### *Shipping Regulations*

Some flower shippers also objected to the "unreasonable" rules allegedly giving mail priority over other types of commodities. They maintained that, especially during busy periods, flowers are left at the airports while space is devoted to mail. The result, they claim, was heavy losses to flower shippers.

The Civil Aeronautics Act of 1938 gives the Post Office Department the power to designate flights on which mail is to be carried; however, no priority is given to mail by the Civil Aeronautics Board or the Act. In fact, the Board stated in Order E-10526 that:

> It has been argued that the conditions prescribed require the carriers to give 'first class' mail priority over freight. Though this is a questionable interpretation of our order, it is clearly established on record that the Department's practice is to require no such priority. The Examiner was thus correct in observing that this mail has no priority except that given it by management. In this connection we note that the yield on this mail would be higher than on some types of freight, thus giving management some incentive to give priority to mail. An additional incentive may lie in the fact that while freight may often be held over, mail must be moved or lost to alternative carriers.

Since mail is carried on a purely voluntary basis, any preference given it by airlines management would indicate that rates on flowers are not excessive relative to mail and other freight.

### *Demand for Flowers*

The prevalent opinion that lower rates would increase the demand for flowers and consequently increase volume of traffic also is questionable, because (1) the demand for cut flowers is relatively inelastic, and (2) the competitive position of California growers is weak compared to growers nearer to eastern markets.

The demand for flowers may be divided into two categories: (1) flowers for special occasions such as funerals, weddings, births, illnesses and holidays, which has an "obligation buying" characteristic; and (2) flowers for everyday home use which depends on low price and minimum service.

The greater proportion of the flowers business is of the first category. According to one study, funeral business alone accounts for 60 percent of all flowers sales, weddings for 15 percent, corsages for 10 percent and decorations about 5 percent.[3] A second study estimates that 60 to 65 percent of all flowers sales are for funerals, 20 to 25 percent for special occasions such as holidays, weddings, and anniversaries, 10 to 20 percent for miscellaneous use such as illness and births, and 2 to 4 percent for everyday home use.[4]

Flowers for funerals, weddings and other special occasions very probably have highly inelastic demand.[5] That is, price reductions to consumers would not yield compensating sales volume for retailers to increase their total net revenues. Therefore, the retail florists tend to maintain relatively constant prices, except for holidays when demand increases and prices rise. Even when wholesale prices are low because of increased supply, prices to customers tend to remain at about the same level. It can be assumed, therefore, that reduction in freight rates would not cause increased demand for flowers, even in the unlikely cases where the reduction would be passed on to consumers in the form of lower prices. Retail prices only partially reflect major changes in wholesale market conditions, which themselves reflect the rigidity of dollar margins on floral items.

### *Retail Margins*

In addition, the relatively inelastic demand for a substantial share of the florists' products and a lack of active price competition makes it easier to add relatively large retail margins. W. K. Trotter found that

[3] E. L. Rada, *Mainland Markets for Hawaiian Flowers and Foliage,* Dept. Agr. Econ., Univ. of Hawaii, Feb. 1952, p. 29.

[4] *Prepackaging of Cut Flowers,* Floricultural Division, Dept. Hort., Ohio State Univ., p. 1.

[5] W. K. Trotter, *Problems in Marketing Florist Crops,* Ithaca, N.Y., Cornell Univ., June 1955, pp. 39-40.

gross margins obtained in four different studies of the retail florist business varied from 51.4 percent to 58.4 percent of net sales. The overall markup of retail florists ranged from 105.8 percent to 140.6 percent. Accessories and supplies used in arrangements of flowers were included in the cost of goods sold. On flowers only, markups were much higher.

The large retail markup is another reason why demand for flowers would not be increased by lower transportation costs. For example, carnations of good quality were sold by retail florists in New York on March 28, 1959, for $2.50 per dozen. This price consists of a wholesale price of $1 per dozen plus a $1.50 markup. If these carnations were shipped from Los Angeles, the transport cost would be 19.65 cents per dozen. Ten percent reduction in air freight rates would result in approximate saving of 2 cents per dozen. If this reduction is passed on, the wholesale price would decline to 98 cents, and the price to the consumer to $2.45 per dozen. Even a reduction of twenty percent would reduce the price to the consumer only to $2.40. Such a small reduction, even if passed on to the buyers, would be unlikely to cause any increase in sales.

In the absence of any effect on demand for cut flowers there is no inducement for air carriers to reduce rates. The probable effect of such reduction would be the transfer of the amount from carrier to retailer, wholesaler or grower.

*Competition for Markets*

It also is doubtful whether lower air freight rates would alone materially improve the competitive position of southern California cut flower growers and shippers. Their out-of-state competition can be divided into two groups of growers: (1) local growers around large metropolitan market areas, and (2) those in other specialized producing areas.

The extent of local competition is indicated by the fact that during 1955 wholesalers of floricultural crops in the New York and Chicago markets, respectively, received about 54 and 63 percent of their total supplies from within 150 miles of their establishments.

As far as transport costs are concerned, local growers are at a definite advantage. Whether the total production cost advantage of California growers offsets the transport cost advantage of growers nearer to markets is not known, because no cost data is available for either California growers or growers in other states.

California growers could capture a metropolitan market from growers nearer to the market only by pricing California flowers below the nearby growers' direct costs of production. If this were attempted through air freight rate reduction alone, rates would most likely have to fall below

the direct costs of the air carriers. Even if California growers enjoyed such a cost advantage that together with rate reduction they could undercut growers nearer to markets, they still might not be able to capture the market. A lack of alternatives and a probability of future profits from land speculation might cause growers in urban areas to continue in business even with a loss of income from current operations.

Some other producing areas are also in a more advantageous location than California growers. Freight reductions probably would have little effect on this competitive position because (1) any freight reductions are likely to be general (across the board) rather than specific (for a particular area only) and (2) competitive areas can switch more easily to other, cheaper modes of transport.

Present air freight rates applicable to California cut flowers are based on the directional imbalance. On the basis of a sample of in-and-out movement of air freight traffic, and in the opinions of some of the airline industry officials, the below-minimum directional rates permitted by the Board have fairly well corrected this situation. Opinions of industry officials differ in regard to future rate reductions. Some maintain that the introduction of jet air cargo carriers, around 1962, will create an imbalance again, and that further changes in directional rates will be justified. The majority, however, think that generally lower air freight rates will divert freight from other modes of transportation, enabling new capacity to be utilized fully in both directions. Thus, any rate reduction in the future is likely to be general rather than based on directional imbalance. Although California producers may benefit still further by a straight percentage reduction, the differentials are likely to be too small to influence competitive position significantly. For example, a ten percent reduction on the Los Angeles to New York rate of $19.65 would amount to $1.96 whereas the Miami to New York rate of $13.80 would be reduced by $1.38.

### *Conclusions*

It is doubtful that either cut flower sales or the competitive position of California growers in out-of-state markets would be improved by lower air freight rates. Certainly, transport costs have not been a large factor in the present supply-demand situation. A more likely explanation of the present situation would start with the high profits just after World War II, which attracted new areas into flower production and greatly expanded the production of existing local growers. Expansion of production has been relatively easy because of the low initial investment required, and under-utilization of the land, greenhouse space, and labor by existing producers. New and improved production methods not

only increased production but also reduced cost advantages of California growers. For example, introduction of low cost cooling and heating systems in greenhouses reduced California grower advantages from climatic conditions. It appears, therefore, that California growers and shippers should examine other cost components to discover ways to lower their total unit costs and thereby compete better with growers whose transportation and packaging costs are lower because of their nearness to markets.

The 58.2 percent increase in cut flower sales in California between 1950 and 1958 can be explained in terms of the 45.6 percent increase in the state's population and the slight increase in per capita sales of cut flowers during that period. The combination of a rapidly increasing population and higher than average per capita incomes in California would imply a further increase in the proportion of total cut flower sales that are marketed within the state. Other things being equal, this is an economically desirable situation.

## A STUDY OF CONSUMER PREFERENCE FOR APPLESAUCE USING THE TWO-VISIT INTERVIEW TECHNIQUE

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THE TESTING of preferences for food has long been a difficult phase of market analysis. While several well-known statistical techniques exist for testing preferences in laboratory studies, relatively little has been done to develop techniques to test actual consumer preferences in the home on other than a panel basis.

This study represents an attempt to measure the preferences of a random sample of 720 New York State homemakers for applesauce, using a recently developed statistical method known as the two-visit interview technique.[1] This technique has been used for several industrial studies but as yet has not been widely used by public institutions.

Applesauce, the most important processed apple product, presented a useful area of study for several reasons. First, several laboratory panel studies of applesauce preferences have been conducted in the past which

* This study was conducted while the author was at Cornell University. It was made in cooperation with the New York State Department of Agriculture and Markets and under the direction of Max E. Brunk, Professor of Marketing. Further details are provided in: *A Survey of Applesauce Preference,* Merchandising Experiments, Paper No. 13, Dept. Agr. Econ., Cornell Univ., Sept. 1960, 8 pp.

[1] The method is described in detail by George E. Ferris in "The K-Visit Method of Consumer Testing," *Biometrics,* 14:39-49, March 1958.

provide a basis for comparison of techniques and results. Secondly, a preliminary consumer study conducted by the author in 1959 suggested that the present U.S. grades for sauce may be based on criteria considered relatively unimportant by consumers.

### *Previous Studies*

Previous preference studies for applesauce have utilized taste panels selected from the staff of the testing institution. The Eastern Regional Research Laboratory of the United States Department of Agriculture has carried on two such studies: one involved 100 tasters drawn at random from the laboratory staff,[2] while in the other a panel of 20 judges was selected from the laboratory staff on the basis of consistency of their tasting judgment.[3] A Pennsylvania State University study incorporated a College of Home Economics taste panel of 60 persons.[4] Results of all three studies indicated a preference for a sauce with relatively high sugar and acid levels.

In contrast to these methods, the author in 1959 conducted a survey of the preference of a random sample of 652 upstate New York consumers for eight commercial brands of applesauce.[5] The brands used were selected from 50 brands sold in New York State that were graded using the United States Grades for applesauce.[6] Three of the eight brands were U.S. Grade A, two were U.S. Grade C, and three were Substandard. Each consumer was presented with two unlabeled brands of the eight and asked to indicate a preference or no preference. Analysis of variance showed that three of the brands were significantly preferred. Surprisingly, these three had received U.S. Grades of C or Substandard. The U.S. Grades for applesauce give equal weight to color, consistency, flavor, texture, and defects, yet in this survey 61 per cent of the reasons for preferring a particular applesauce concerned flavor and taste, 23 per

[2] E. C. Dryden and Claude H. Hills, "Consumer Preference Studies on Applesauce: Sugar-Acid Relations," *Food Technology*, 11:589-91, 1957.

[3] M. L. Buch, E. C. Dryden, Claude H. Hills and James R. Oyler, "Organoleptic Evaluation of Applesauce Fortified with Essence and Citric Acid," *Food Technology*, 10:560-62, 1956.

[4] F. B. Thomas and C. M. Riter, *Varietal Influences on Quality of Applesauce Blends*, Pa. State Univ., Agr. Expt. Sta. Prog. Rept. 193, Aug. 1958, 4 pp.

[5] Douglas J. Dalrymple, *A Survey of Applesauce Preference*, Merchandising Experiments, Paper No. 7, Dept. Agr. Econ., Cornell Univ., Sept. 1959, 7 pp.

[6] U. S. Grades are based on five characteristics: color, flavor, consistency, texture, and defects. Good and fairly good ratings for the five factors are defined in the grading standards. A maximum of 20 points is given for each characteristic. Based on the number of points achieved, a grade of either A, C, or Substandard is assigned. Consistency is a measure of thickness, texture is a measure of size of applesauce particles, and defects are the bruise marks and pieces of skin and core that show up in applesauce. (*United States Standards for Grades of Canned Applesauce*, U.S. Dept. Agr., Agr. Mktg. Serv., Sept 18, 1950.)

cent concerned consistency and texture, 3 per cent were related to color, while no reasons were associated with defects. Also, two of the test brands that were highest in defects were among the three preferred brands. These results raised the question of whether the U.S. Grades for applesauce are representative of consumer preference.

*Methods Used in 1960 Applesauce Survey*

In order to determine whether consumers had preferences for experimental blends of applesauce, a total of 720 separate consumer interviews were conducted throughout upstate New York in February and March of 1960. These interviews were separated into 15 different tests with 48 interviews taken for each test.

The two-visit procedure was used to see if the homemaker had a consistent preference between the two blends offered. The applesauce was presented to the housewives in their own kitchens. The samples were placed on paper plates and the housewives were asked to taste one sample and then a second using wooden spoons. After a housewife had tasted both blends she was asked, "Do you prefer one of the two samples or do you have no preference?"

A week later the same blends were offered (to the same homemaker) with different code numbers. The same enumerator conducted both interviews using a standard interview procedure. To control possible bias the enumerators were not told the purpose of the second interview and they were not told about the coding system or the differences in the test blends. Temperature variation was negligible. Order of presentation bias and code number bias were controlled by using fixed combinations of code numbers and blends.

The principal advantage of the two-visit technique was that it checked on the reliability of the homemaker to differentiate between the test blends. The use of a one-visit technique in the 1959 survey showed a large percentage preferring each brand and a very small percentage with no preference. The two-visit technique made it possible to sort out the individuals with real preferences and provided a more accurate estimate of the proportion of the population with no real preference.[7]

The total of 720 interviews was divided according to the distribution of the upstate New York population living in urban and rural areas. The 504 urban interviews were apportioned to 10 cities[8] according to the number of people living in cities of each size. The individual home-

[7] Real preference refers to the proportion of housewives who actually have a preference for one brand and who will consistently pick that brand each time they are confronted with a choice.

[8] Cities included: Buffalo, Jamestown, Hornell, Rochester, Syracuse, Watertown, Schenectady, Endicott, Walden, and Hudson.

makers were selected on the basis of a random sample of blocks from each city. The 216 rural interviews were obtained from homes along a selected highway route in upstate New York.

### *Blends of Applesauce Used*

A total of 12 different experimental blends of applesauce were used in the study. They were packed to specification by two New York State processors to represent the factors of flavor and consistency considered most important by consumers in the 1959 study.

Blends A, B, C, and D were used to test variety effects. Blend A was made with 100 per cent McIntosh apples. Blend B had 50 per cent McIntosh and Blend C had 25 per cent McIntosh. The balance in each case was made up of equal parts of Baldwins, Greenings, and Spys. Blend D was made with equal parts of Baldwins, Greenings, and Spys. The sugar levels of the four blends were similar.[9] The straight McIntosh blend was noticeably thinner in consistency than the other three blends.

Blends E, F, and H were used to evaluate flavor as measured by different sugar levels. These three blends were made with a mixture of Baldwins, Greenings, and Spys. Blend E had a relatively low sugar level, F had a medium sugar level, and H had a high sugar level.[10]

Blends F, I, and J were used to test consumer reactions to different acid levels. Blend F had an acid level of 0.35 per cent, blend I 0.52 per cent, and J 0.57 per cent. These three blends were made with a Baldwin, Greening, and Spy mixture.

Blends K, L, and M were prepared to test consumer reactions to different consistency levels. These three blends were made with a mixture of Spys, Baldwins, Yorks, and Ben Davis. Blend K had the regular consistency, L was thinner, and M was the thinnest blend.

### *Analysis of Survey Data*

The number of homemakers who picked each of the blends during the two-visit interviews were tabulated (Table 1). The homemakers could combine preferences or no preference in nine possible ways on the two visits. They could pick the same blend on both visits (*Naa, Nbb*) or they could pick one blend on the first visit and another on the second (*Nab, Nba)* or they could make a choice in combination with a no preference vote (*Nao, Nbo, Noa, Nob*) or have a no preference on both visits (*Noo*).

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[9] The actual sugar levels used were: blend A 22.6° brix, blend B 21.9°, blend C 21.8°, and blend D 20.9°. Brix is the refractometric sucrose value. A minimum score of 16.5° brix is required for applesauce to make U.S. Grade A.

[10] The actual sugar levels used were: blend E 16.8° brix, blend F 20.3°, and blend H 21.5°.

TABLE 1. PREFERENCES FOR 12 BLENDS OF APPLESAUCE, TWO-VISIT CONSUMER SURVEY, NEW YORK STATE, 1960

| Test | Blend Pairs | | Preference Categories* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | *a* | *b* | *Naa* | *Nbb* | *Nab* | *Nba* | *Nao* | *Noa* | *Nbo* | *Nob* | *Noo* |
| 1 | A | B | 12 | 15 | 9 | 7 | 0 | 2 | 0 | 1 | 2 |
| 2 | A | C | 9 | 12 | 10 | 12 | 2 | 0 | 0 | 2 | 1 |
| 3 | A | D | 14 | 11 | 11 | 5 | 1 | 1 | 0 | 1 | 4 |
| 4 | B | C | 7 | 12 | 8 | 10 | 2 | 2 | 3 | 2 | 2 |
| 5 | B | D | 11 | 11 | 7 | 8 | 0 | 7 | 0 | 1 | 3 |
| 6 | C | D | 19 | 6 | 8 | 5 | 1 | 4 | 1 | 3 | 1 |
| 7 | E | F | 3 | 18 | 12 | 6 | 1 | 2 | 2 | 4 | 0 |
| 8 | E | H | 4 | 15 | 12 | 8 | 0 | 0 | 2 | 5 | 2 |
| 9 | F | H | 4 | 12 | 11 | 6 | 1 | 5 | 4 | 3 | 2 |
| 10 | I | J | 27 | 3 | 6 | 7 | 1 | 3 | 0 | 1 | 1 |
| 11 | I | F | 8 | 20 | 10 | 7 | 0 | 0 | 0 | 2 | 1 |
| 12 | J | F | 6 | 26 | 6 | 3 | 0 | 2 | 0 | 4 | 1 |
| 13 | K | L | 6 | 14 | 17 | 4 | 1 | 1 | 1 | 3 | 1 |
| 14 | L | M | 8 | 12 | 13 | 9 | 1 | 1 | 0 | 4 | 0 |
| 15 | K | M | 3 | 16 | 10 | 10 | 1 | 3 | 3 | 1 | 1 |

* Small *a* represents the first blend in each of the 15 blend pairs and small *b* represents the second blend. Small *o* represents no preference.

TABLE 2. PROPORTION OF HOMEMAKERS PREFERRING DIFFERENT BLENDS OF APPLESAUCE, CONSUMER SURVEY, NEW YORK STATE, 1960

| Test | Blend Pairs | | Preference *a* $\hat{\pi}a$ | Preference *b* $\hat{\pi}b$ | No Real Preference $\hat{\pi}o$ |
|---|---|---|---|---|---|
| | *a* | *b* | | | |
| | | | | *(Per cent)* | |
| 1 | A | B | 10[a] | 16 | 74 |
| 2 | A | C | − 3[b] | 3 | 97 |
| 3 | A | D | 16 | 9 | 75 |
| 4 | B | C | − 3 | 7 | 93 |
| 5 | B | D | 9 | 9 | 82 |
| 6 | C | D | 26* | −1 | 74 |
| 7 | E | F | −13 | 18 | 82 |
| 8 | E | H | −11 | 12 | 88 |
| 9 | F | H | − 9 | 8 | 92 |
| 10 | I | J | 41* | −9 | 59 |
| 11 | I | F | 0 | 25* | 75 |
| 12 | J | F | 3 | 45* | 52 |
| 13 | K | L | − 9 | 8 | 92 |
| 14 | L | M | − 6 | 2 | 98 |
| 15 | K | M | −14 | 13 | 87 |

* Significantly preferred to paired blend at 5 per cent level.

[a] The preference for blend A of 10 per cent in test 1 was calculated from data in Table 1, using the preference formulas shown in the text and the values for test 1: $N=48$, $M=21$, $Nx=16$, $Ny=3$ and $Noo=2$.

[b] The minus values for $\hat{\pi}a$ and $\hat{\pi}b$ represent simple variation around the true parameter 0. They are the result of the eagerness of the homemakers to indicate a preference. The minus values are assumed to be 0 in the calculation of $\hat{\pi}o$.

Three preference parameters were computed from the preference data, and these included an estimate of the proportion of the population with a real preference for one blend, $\hat{\pi}a$; an estimate of the proportion with a real preference for a second blend, $\hat{\pi}b$; and an estimate of the proportion with no real preference, $\hat{\pi}o$ (Table 2). The factor $\hat{p}$ was a nuisance parameter which was used in the calculation of the preference parameters. $N$ was the number of homemakers interviewed and it was 48 in each test. The preference parameters $\hat{\pi}a$, $\hat{\pi}b$, and $\hat{\pi}o$ were computed using the following formulas:[11]

$$M = N - Naa - Nbb$$

$$Nx = Nab + Nba$$

$$Ny = Nao + Noa + Nbo + Nob$$

$$\hat{p} = \frac{M \pm \sqrt{M^2\left(Noo + \frac{Ny}{2}\right)(2Nx + Ny)}}{2Noo + Ny}$$

$$\hat{\pi}a = \frac{Naa(1 - \hat{p}^2) - (N - Nbb)\hat{p}^2}{N(1 - 2\hat{p}^2)}$$

$$\hat{\pi}b = \frac{Nbb(1 - \hat{p}^2) - (N - Naa)\hat{p}^2}{N(1 - 2\hat{p}^2)}$$

$$\hat{\pi}o = 1 - \hat{\pi}a - \hat{\pi}b$$

The study showed that although most homemakers stated they had a preference, many actually did not have a preference for the test blends. This is shown by the large values for the *Nab* and *Nba* categories, which represented the homemakers who switched from one blend to another

[11] The formulas were based on a proposed model for the behavior of the consumer population given by George E. Ferris, *op. cit.*, p. 41. "Let the consumers who really prefer A, really prefer B, and those who cannot discriminate or have no preference, be referred to as consumer types *a*, *b*, and 0, respectfully. Let $P_i(j)$ denote the probability of a consumer type $i$ ($i = a, b, 0$) voting for product $j$ on any particular occasion when the pair of products $A$ and $B$ is presented; $j = A, B$, or 0, and the 0 denotes a no preference vote." Ferris assumed: "$P_a(A) = P_b(B) = 1$, $P_a(B) = P_b(A) = P_a(0) = P_b(0) = 0$, $P_o(0) = 1\text{–}2p$, $P_o(A) = P_o(B) = p$, where $0 \leq p \leq \frac{1}{2}$, i.e., it is assumed that those who really prefer $A$ (or $B$) will consistently so vote each time they are confronted with the choice, and that those with no consistent preference (who include non-discriminators, those who are indifferent in their preference, and others who think they have a preference at any given time) will vote sometimes for $A$ (with probability $p$), sometimes for $B$ (with probability $p$) and will admit to having no preference the rest of the time (probability $1 - 2p$)." The likelihood function: $L = (\pi a + p^2\pi o)^{Naa} \quad (\pi b + p^2\pi o)^{Nab} \quad (p^2\pi o)^{Nab + Nba} \quad [p(1 - 2p\pi o)]^{Nao + Noa + Nbo + Nob}$ $[(1 - 2p)^2\pi o]^{Noo}$ was combined with the formulas for $M$, $Nx$ and $Ny$ to give the formulas for the estimates: $\hat{\pi}a$, $\hat{\pi}b$, and $\hat{\pi}o$.

(Table 1). The two-visit interview technique thus checked the reliability of the preference statements and provided an estimate of the proportion of the homemakers with no real preference.

### *Preferences for Experimental Blends*

The experimental blends tested were divided into four main groups on the basis of varieties, sugar levels, acid levels, and consistency levels.

Tests 1 through 6 matched blends made with varying proportions of McIntosh and other varieties. The proportion of homemakers who had no real preference between these blends varied from 74 per cent to 97 per cent (Table 2). Blend C with 25 per cent McIntosh was significantly preferred to blend D which had no McIntosh.

Tests 7, 8, and 9 compared preferences for three different sugar levels (Table 2). Between 82 and 92 per cent of the homemakers had no real preference between the blends. Those who had a preference preferred the sweeter blend in each of the three test pairs.

Tests 10, 11, and 12 compared acid levels and produced the most definite consumer reaction of any of the pairs tested (Table 2). All three pairs gave significant results and in each case the blend with the lowest acid level was preferred.[12] However, between 52 and 75 per cent of those interviewed had no real preference between the acid levels.

Tests 13, 14, and 15 compared consistency preference. Between 87 per cent and 98 per cent of the homemakers interviewed in the consistency test had no real preference between the blends. In the two pairs (KL, KM) where there was a readily observable difference in consistency, those who had a real preference preferred the thinner sauce.

### *Additional Survey Results*

In addition to obtaining preferences for the experimental blends of applesauce, this study included several questions on how homemakers use applesauce. These questions were completed after the homemaker tasted the applesauce blends. The most popular ways to serve applesauce were as a side dish or with meat. Of those interviewed, 76 per cent used applesauce with pork and 61 per cent used it to make cake. About 35 per cent of the total interviewed said they still make some of their own applesauce.

The survey disclosed that 51 per cent added spices to their applesauce. Twenty-four per cent of the homemakers interviewed usually added cinnamon, ten per cent added cinnamon and nutmeg, while the remaining 17 per cent added other spices. Despite this preference, out of

[12] This observation contrasts with the panel studies conducted by the U.S. Department of Agriculture and Pennsylvania State University (footnotes 2, 3, and 4) in which a sauce with a high acid level was preferred.

the more than 60 brands of applesauce sold in New York State, only one is a spiced applesauce, and it retails for about three times as much as unspiced sauce.

### *Conclusions*

The only significant varietal preference expressed by consumers was for the blend with 25 per cent McIntosh apples as compared to the blend with no McIntosh. Yet very few McIntosh are used to make applesauce in New York, despite the fact that they represent about 35 per cent of the apple crop. This may be because under the present U.S. Grades applesauce made with McIntosh is likely to grade C or lower because of its fine texture and thin consistency. Since the study revealed that the majority of the homemakers had no real preference between applesauce made with or without McIntosh apples, it would appear that the U.S. Standards unjustly discriminate against this variety.

Use of the two-visit interview technique showed that most homemakers are not very discriminating about applesauce. Between 76 and 98 per cent of the homemakers had no real preference between the test blends which reflected different variety mixtures, sugar levels, and consistencies. The significant absence of consumer preferences suggests that consumers would have to be presented with very distinct differences in applesauce quality before they would have a preference. The present U.S. Grades for applesauce, which are based on very minute differences in five grading characteristics, appear to be based on unrealistic assumptions about consumer preferences for applesauce.

## EFFECTS OF SELECTED VARIABLES ON PRICES OF CALVES IN VIRGINIA FEEDER CALF SALES[1]

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FEEDER calf sales were first organized in Virginia in 1938 through the cooperative efforts of members of the V.P.I. Agricultural Extension Service, graders of the Virginia Division of Markets, and local livestock producers. These sales, organized as demonstrations, were developed to meet the needs of farmers with small herds of cows, generally from 25 to 30 head, so they could offer attractive lots of feeder

[1] This article is adapted from a thesis presented by the senior author to Virginia Polytechnic Institute in partial fulfillment of the requirements for the degree of Master of Science in Animal Husbandry. Mr. Williamson is with the Extension staff, Messrs. Carter and Gaines with the Experiment Station staff, in the Department of Animal Husbandry.

calves in large enough groups to attract buyers and successfully compete with larger producers in other areas. The sales have grown from a demonstration to a way of marketing feeder cattle.

The objective of this study was to estimate the effects of certain variables on prices of calves in the Virginia feeder calf sales which, within limitations, are under the control of producers and sale managers; namely, size of sale (total number of head sold), size of sale lot, breed, weight of calves, grade, and crossbred compared to straightbred calves.

## *Source and Analysis of Data*

### *Source and nature of the data*

Records were available on all Virginia feeder calf sales as far back as 1941. However, from 1941 through 1950, the standards used for grading the calves, which were applied by members of the State Department of Agriculture, were obviously different from the standards used after 1950. Therefore, only those sales held from 1951 through 1956 were used in this study. Some sales were organized after 1951, and some sales held in 1951 were discontinued before 1956. Only the 21 sales held annually from 1951 through 1956 were included in this analysis. The number of observations (pens) and total number of head included in this study are shown in Table 1.

### *Adjustment of prices*

Certain factors peculiar to Virginia and not national in extent may have caused Virginia feeder calf sale prices to be abnormally inflated or deflated relative to national prices in a particular season or part of a season. Since the variables studied were not equally distributed among years, or even among seasons within a year, all observed prices were adjusted to a percentage of the national price level. A simple average of the prices quoted on steer and heifer calves grading "good" and

TABLE 1. NUMBER OF OBSERVATIONS, TOTAL NUMBER OF HEAD, AND AVERAGE PRICE PER HUNDREDWEIGHT, BY YEARS, FOR CALVES INCLUDED IN THIS ANALYSIS

| Year | Number of observations or pens | | Number of head | | Average price per hundredweight | |
|---|---|---|---|---|---|---|
| | Steers | Heifers | Steers | Heifers | Steers | Heifers |
| 1951 | 842 | 661 | 10,352 | 5,753 | $39.70 | $39.39 |
| 1952 | 960 | 686 | 12,020 | 6,737 | 29.25 | 25.33 |
| 1953 | 919 | 681 | 11,810 | 6,078 | 19.67 | 15.40 |
| 1954 | 942 | 672 | 13,524 | 6,735 | 21.15 | 15.40 |
| 1955 | 873 | 615 | 12,518 | 6,047 | 22.61 | 17.45 |
| 1956 | 986 | 644 | 14,618 | 6,882 | 21.78 | 16.46 |
| Total | 5,522 | 3,959 | 74,842 | 38,232 | | |

"choice" and weighing between 300 and 500 pounds at the three terminal markets—Chicago, Kansas City, and Omaha—was used to represent the national price level.

During the period covered by this study (1951-1956), Virginia average prices varied greatly from year to year, as shown in Table 1. For the last three years of this study—1954, 1955, and 1956—prices were relatively stable, and an average based on these three years appeared to be more realistic than an average based on all six years. To remove much of the effect of these extreme year variations, all prices were adjusted to the 1954-1956 Virginia level, which was $21.75 per hundredweight for steer calves and $16.30 for heifer calves.

*Procedure of analysis*

The sales were classified by total number of head sold into seven groupings as follows: 300-500 head, 501-700, 701-900, 901-1100, 1101-1300, 1301-1500, and over 1500. These groupings included all the sales held, since the smallest sale was 320 head and the largest 3,818 head.

The number of calves sold in a particular lot at a sale was determined by the number of calves of a certain breed, sex, grade, and weight delivered to the sale. No attempt was made to pen the calves into predetermined size groups. Consequently, the sale lots varied from a single calf to as many as 120 head. For the purpose of this study, they were classified into groups of 1-10 head, 11-20, 21-30, 31-40, 41-50, and 51 or more.

The calves at the various sales were classified by breed according to the typical color markings of the breed. It is likely that some of those classified as straightbred (Angus, Hereford, or Shorthorn) may not have been entirely free of crossbreeding. However, calves with color markings obviously indicating crossbreeding were penned and sold separately.

The Hereford-Shorthorn and Hereford-Angus crosses, so classified because of their color markings, constituted the crossbred groups. There were so few Angus-Shorthorn crosses that they were not used in this study.

The minimum and maximum weight limitations, as restricted by most sale committees, were 300 and 700 pounds. In most sales, the calves were grouped on 50-pound weight intervals. However, for the purpose of this study the lots were grouped by 100-pound intervals as follows: 300-400 pounds, 401-500, 501-600, and 601-700.

The "fancy," "choice," "good," and "medium" grades were the only ones included in this study. Since most sales combined the "fancy" and "choice" grade calves into one lot and sold them as one grade, all the

"fancy," "fancy and choice," and "choice" lots were combined into one classification and were identified as "fancy and choice."

Only steers and heifers were used for this analysis, since calves classified as bulls, stags, and spayed heifers were rejected from the sales after 1952. It was felt a more worthwhile study could be made by analyzing the data for steers and heifers separately. In 1952 the herd-building and restocking demand, which, for the previous three years, had caused heifers to sell for prices approximately equal to steers, was curtailed drastically. Consequently, prices of heifers dropped to more than $4.00 per hundredweight below those for steer calves. This price relationship of heifers to steers continued throughout the remaining four years covered by this study. It is suggested that during these years when heifer prices were relatively low few buyers attended the sales with the specific intention of buying heifer calves. Accordingly, the heifers were bought by dealers, feeders, and others who were extremely price conscious.

The least squares method[2] was used in this analysis because of the unequal subclass numbers and the expected uneven variation due to the effects of certain variables; namely, size of sale, size of sale lot, breed, and average weight of sale lot.

Assuming no interactions, the model for the least squares analysis of the nonorthogonal data was written:

$$Y_{ijkmnop} = \mu + s_i + p_j + b_k + w_m + g_n + c_o + e_{ijkmnop},$$

where

$Y$ = price per hundredweight;
$\mu$ = population mean price;
$s$ = size of sale (groups of 200 head, seven groups);
$p$ = size of sale lot (groups of 10 head, six groups);
$b$ = breed with five classifications (1—Hereford, 2—Angus, 3—Shorthorn, 4—Hereford-Shorthorn, 5—Hereford-Angus);
$w$ = average weight of sale lot (one hundred pound weight divisions, four groups);
$g$ = grade with three classifications (1—medium, 2—good, 3—fancy and choice);
$c$ = straightbred or crossbred; and
$e$ = random unexplained effects peculiar to a particular sale lot.

Two matrices of linear equations (one for steers and one for heifers) were constructed according to this model and solved for estimates of differences and their standard errors. Since the straightbred vs. cross-

[2] See, e.g., Kempthorne, Oscar, *The Design and Analysis of Experiments,* John Wiley & Sons, Inc., New York, 1952; Harvey, Walter R., *Least-Squares Analysis of Data with Unequal Subclass Numbers,* ARS-20-8, USDA, 1960.

TABLE 2. REGRESSION COEFFICIENTS AND STANDARD ERRORS, STEER CALVES

| Classification | Number of observations or pens | *b* Values[a] | Standard error |
|---|---|---|---|
| Size of Sale | | | |
| 300– 500 head | 346 | −$0.19 | ±.13 |
| 501– 700 head | 1,585 | − .23** | ±.08 |
| 701– 900 head | 1,478 | Base | |
| 901–1100 head | 702 | + .46** | ±.10 |
| 1101–1300 head | 473 | + .26* | ±.12 |
| 1301–1500 head | 193 | + .95** | ±.17 |
| 1501–up head | 745 | + 1.72** | ±.10 |
| Size of Sale Lot | | | |
| 1–10 head | 2,823 | Base | |
| 11–20 head | 1,494 | + .28** | ±.08 |
| 21–30 head | 721 | + .55** | ±.10 |
| 31–40 head | 279 | + .33* | ±.15 |
| 41–50 head | 106 | + .47* | ±.23 |
| 51–up head | 99 | + .44 | ±.24 |
| Breed | | | |
| Hereford | 2,630 | Base | |
| Angus | 2,124 | + .16* | ±.07 |
| Shorthorn | 278 | − 1.05** | ±.15 |
| Hereford-Shorthorn | 287 | − 2.21** | ±.14 |
| Hereford-Angus | 203 | − 2.59** | ±.17 |
| Average Weight of Sale Lot | | | |
| 300–400 pounds | 1,566 | − .21** | ±.08 |
| 401–500 pounds | 1,861 | Base | |
| 501–600 pounds | 1,418 | − .49** | ±.08 |
| 601–700 pounds | 677 | − 1.30** | ±.10 |
| Grade | | | |
| Medium | 1,550 | − 2.45** | ±.08 |
| Good | 1,922 | Base | |
| Fancy and Choice | 2,050 | + 2.11** | ±.07 |
| Straightbred vs. Crossbred | | | |
| Straightbred | 5,032 | Base | |
| Crossbred | 490 | − 2.30** | ±.11 |

* Significant at 5 per cent level.
** Significant at 1 per cent level.
[a] The *b* values are partial regressions and represent differences in price (dollars per hundredweight) from the base group for a particular classification with all other effects held constant.

bred variable ($c_o$) was not independent of the breeds variable ($b_k$), the classification straightbred vs. crossbred was deleted when the breed effects were estimated and vice versa.

### *Results and Discussion*

Estimates of the effects of the various factors studied (size of sale, size of sale lot, breed, average weight, grade, and straightbred vs. crossbred) on the prices per hundredweight are shown in Tables 2 and 3.

TABLE 3. REGRESSION COEFFICIENTS AND STANDARD ERRORS, HEIFER CALVES

| Classification | Number of observations or pens | *b* Values[a] | Standard error |
|---|---|---|---|
| Size of Sale | | | |
| 300– 500 head | 248 | +$0.77** | ±.15 |
| 501– 700 head | 1,107 | + .18* | ±.09 |
| 701– 900 head | 1,061 | Base | |
| 901–1100 head | 477 | + .02 | ±.12 |
| 1101–1300 head | 311 | − .75** | ±.14 |
| 1301–1500 head | 128 | − .15 | ±.20 |
| 1501–up head | 627 | + .20 | ±.11 |
| Size of Sale Lot | | | |
| 1–10 head | 2,664 | Base | |
| 11–20 head | 874 | + .14 | ±.09 |
| 21–30 head | 255 | − .02 | ±.15 |
| 31–40 head | 86 | + .35 | ±.24 |
| 41–50 head | 30 | + .84* | ±.40 |
| 51–up head | 50 | + .47 | ±.32 |
| Breed | | | |
| Hereford | 2,095 | Base | |
| Angus | 1,402 | + .39** | ±.08 |
| Shorthorn | 154 | − .16 | ±.19 |
| Hereford-Shorthorn | 186 | − 1.54** | ±.17 |
| Hereford-Angus | 122 | − 1.72** | ±.20 |
| Average Weight of Sale Lot | | | |
| 300–400 pounds | 1,418 | − .08 | ±.08 |
| 401–500 pounds | 1,469 | Base | |
| 501–600 pounds | 870 | − .18 | ±.09 |
| 601–700 pounds | 202 | − .72** | ±.17 |
| Grade | | | |
| Medium | 1,074 | − 1.43** | ±.09 |
| Good | 1,404 | Base | |
| Fancy and Choice | 1,481 | + 1.45** | ±.08 |
| Straightbred vs. Crossbred | | | |
| Straightbred | 3,651 | Base | |
| Crossbred | 308 | − 1.77** | ±.13 |

* Significant at 5 per cent level.
** Significant at 1 per cent level.
[a] The *b* values are partial regressions and represent differences in price (dollars per hundredweight) from the base group for a particular classification with all other effects held constant

These effects are expressed as partial regression coefficients (*b* values) in terms of dollars per hundredweight for deviations of each classification from an arbitrarily chosen base. Standard errors of the estimates (in cents) are also shown.

*Size of sale*

The estimates indicate that size of sale had a large, consistent, and statistically significant effect on the average price received for steer calves. The average difference in price attributed to size of sale amounted

to 32¢ per hundredweight for each increase of 200 head above the 300 to 500 group. The large difference in the 1500 and over group ($1.72 per hundredweight) was possibly caused by a single sale, the Winchester sale. In three of the six years involved in this study, this sale was the only one in this grouping; and in each of the other three years, there was only one other sale with more than 1500 head. Because of its excellent geographic location, prices at the Winchester sale may have tended to be higher than at the other sales included in this analysis.

Size of sale did not have the same consistent effect on the average price of heifer calves as was true of steer calves.

*Size of sale lot*

The estimates found in Table 2 indicate a definite price advantage for steer calves sold in larger lots. This was not a linear trend, however. Lots with 11 to 20 head averaged 28¢ per hundredweight higher than the 1-to-10 base group. The highest average price was shown by the 21-to-30-head group, which was 55¢ per hundredweight above the 1-to-10 group. Prices for all classifications above 30 head were significantly higher than the base, but were not significantly different in price from the 21-to-30 head group.

The results of this analysis suggest that there is a tendency for the average price of heifer calves to increase as the size of sale lot becomes larger in the special feeder calf sales. However, as shown in Table 3, the 41-to-50 head group was the only classification that showed a significant variation from the 1-to-10 group.

St. Clergy, *et al.* (1956),[3] reported that groups outsold singles, grade for grade, at the Delhi, Louisiana, feeder calf sale held in November, 1956. Choice animals sold in groups averaged $16.87 per hundredweight, compared with $15.48 for those sold singly. Similar results were reported for other grades. Also, the price advantage of groups was more evident for steer calves than for heifers.

*Breed*

The location of the majority of the Angus cattle in the state is suggested as an explanation of at least part of the price advantage shown by this breed over the Herefords and Shorthorns. A majority of the Angus cattle were located in the central and northern sections of the State, where feeder calves have generally sold for slightly higher prices than in the southern and southwestern sections, where Herefords were in the majority. Also, most of the Shorthorns included in this study were located in the southwestern part of the State. These higher prices in the

[3] St. Clergy, Clyde, Jimmy Goodwin, and M. D. Woodin, *A Report on the Delhi Feeder Steer and Calf Sale,* La. Agr. Exp. Sta. Circ. 198, 1956.

central and northern parts of the State may have been caused by the closeness of these sales to Maryland and Pennsylvania feeders, to whom many of the calves were sold, and consequently lower transportation costs.

The significantly lower estimates shown by the Hereford-Shorthorn and Hereford-Angus calves below the Hereford breed is perhaps explained in part by buyers' suspicion that there may have been some nonbeef breeding involved in these crosses, which would make them less valuable for feeding purposes.

*Average weight of sale lot*

Steer calves weighting from 401 to 500 pounds sold for significantly higher prices than those heavier or lighter. The same trend was evident for heifer calves. Among the heifers, however, only the 601 to 700 pound classification showed a statistically significantly lower price than the 401 to 500 pound base group.

*Grade*

The calves were graded on the basis of standards outlined by Fraser and Slater (1942).[4] Most buyers at the Virginia feeder calf sales have accepted these grade divisions, as applied by personnel of the Virginia State Department of Agriculture, to be a logical and real value classification of feeder calves. Since "feeder" grades and "slaughter" grades are positively correlated, as suggested by Carter and Kincaid (1959)[5] and indicated by Knapp, *et al.* (1951),[6] some price variation between the grades should be expected.

St. Clergy, *et al.* (1956),[7] reported that there was considerable variation in prices received for animals of the same grade at the Delhi, Louisiana, feeder calf sale. However, the average price was closely related to the grade level. The premium per hundredweight for each grade over the next lower grade averaged $1.00, $2.27, $2.74, $1.03, and $1.96 for "fancy," "choice," "good," "medium," "common," and "inferior," respectively. This amounted to an average spread of approximately $2.00 per hundredweight between each full grade.

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[4] Fraser, W. O., and Don T. Slater, *Market Classes and Grades of Feeder and Stocker Cattle*, U.S. Dept. Agr. Cir. 505, 1942.

[5] Carter, R. C., and C. M. Kincaid, "Estimates of genetic and phenotypic parameters in beef cattle, III, Genetic and phenotypic correlations among economic characters," *J. Animal Sci.* 18:331, 1959.

[6] Knapp, Bradford, Jr., and R. T. Clark, "Genetic and environmental correlations between weaning scores and subsequent gains in the feed lot with record of performance steers," *J. Animal Sci.*, 10:365, 1951.

[7] *Op. cit.*

*Straightbred vs. crossbred*

The Hereford, Angus, and Shorthorn breeds were combined to represent the straightbred classification for the purpose of analyzing the effect of straightbred vs. crossbred on the average price of calves in the special sales. The Hereford-Shorthorn and Hereford-Angus crosses were combined to represent the crossbred classification. Crossbred steers averaged $2.30 per hundredweight less than straightbreds. This difference appeared to be rather large in view of the fact that adjustments for size of sale, size of sale lot, average weight, and grade were made in arriving at these estimates. Uniformity is an important factor in merchandising feeder calves, however, as was pointed out by Smith (1956).[8] Because of the relatively small number of crossbred calves, sale managers often sacrificed uniformity of color and weight in order to conserve pen space. This most likely contributed to the lower price of these calves.

It is suggested that a major contributing factor to the variation shown by crossbred relative to straightbred heifers was their location in the sale order. Usually, crossbred heifers were the last calves to be sold in a sale. Also, most often they were sold in very small groups. Consequently, it would be reasonable to assume that the buyers attending a sale with the intention of buying larger, higher-grading lots would have purchased their limit or postponed their buying until a later sale by the time the crossbred heifers were sold.

*Summary*

Records of 21 Virginia feeder calf sales held annually from 1951 through 1956 were studied to determine the effect of size of sale, size of sale lot, weight, grade, and breed on the average prices received for the calves.

Steer calves sold in large feeder calf sales generally averaged higher in price than those sold in small sales, other variables held constant. The size of sale appeared to make very little difference in the price of heifer calves.

The estimates indicated the optimum size of sale lot for steer calves in the special calf sales to be somewhere between 21 and 30 head. However, lots with more than 30 head were not significantly different in price from the suggested optimum sale lot size. There was an indication that the average price of heifer calves was positively correlated with the size of sale lot.

[8] Smith, Harry H., *Livestock Marketing in the United States*, Colo. Agr. Ext. Ser. Bul. 442-A, 1956.

Steer calves of Angus and Hereford breeding averaged considerably higher in price than Shorthorn, Hereford-Shorthorn and Hereford-Angus steers. Also, when the three breeds—Angus, Hereford, and Shorthorn—were combined, they averaged significantly higher in price than the crossbred steers. Heifer calves of Angus breeding showed an obvious price advantage over Hereford and Shorthorn heifers. The straightbred Angus, Hereford, and Shorthorn heifers averaged substantially more per hundredweight than comparable crossbred calves.

Buyers patronizing the special sales during the period covered by this study preferred calves weighing between 400 and 500 pounds. Calves weighing between 300 and 400 or between 500 and 600 pounds were penalized slightly in price per hundredweight. Calves weighing over 600 pounds sold for considerably less per hundredweight than lighter-weight calves.

The average price spread between "medium," "good," and "fancy and choice" steer calves was in excess of $2.00 per hundredweight. The spread in price between similar grades of heifer calves was slightly less than $1.50 per hundredweight.

## THE DIET PROBLEM REVISITED: A LINEAR PROGRAMMING MODEL FOR CONVEX ECONOMISTS

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IT IS almost axiomatic that a text in operations research or linear programming includes an example of the classic diet problem, preferably in an introductory chapter, before moving on to more practical applications, e.g., nut and gasoline blending problems.[1] Typically, the objective function to be minimized is the monetary cost of the diet, subject to a number of constraints which pertain to minimum food value requirements. However, in today's affluent society it may be argued that the principle dietary problem of the modern sedentary American is one of opulence, or perhaps corpulence, rather than cost and that the proper objective of a diet should be to minimize caloric input rather than monetary output. Consequently, the purpose of this paper is to utilize the general linear-programming technique in order to derive such an optimal diet and still provide some leeway for indulgence so that the

[1] For example, see R. Dorfman, P. Samuelson, and R. Solow, *Linear Programming and Economic Analysis* (New York, 1958), pp. 9-31; D. Gale, *Theory of Linear Economic Models* (New York, 1960), pp. 1-4; W. Garvin, *Introduction to Linear Programming* (New York, 1960), pp. 58-61; and S. Gass, *Linear Programming* (New York, 1958), pp. 9-10.

finicky diner is not restricted to an unpalatable sequence of identical meals.

The original linear-programming formulation of the minimum-cost diet was subject to nine constraints and included 86 choice variables, i.e., foods and slack variables, hence restricting the diet to a maximum of nine foods.[2] Two solutions were derived, one via the simplex procedure and the other via a systematic trial-and-error method. The simplex-derived diet consisted of assorted quantities of wheat flour, evaporated milk, cabbage, spinach, dried navy beans, corn meal, peanut butter, lard, potatoes, and beef liver, whereas the other excluded the latter five foods. The annual cost of either diet was under $40 in 1939 prices.[3]

### *The Revised Problem*

The revised diet problem is as follows: select $x_1, x_2, \ldots, x_n$ from the field of real numbers so as to minimize the linear function

$$z = c_1x_1 + c_2x_2 + \cdots + c_nx_n, \tag{1}$$

subject to

$$\begin{aligned} a_{11}x_1 + a_{12}x_2 + \cdots + a_{1n}x_n &\geqq b_1 \\ a_{21}x_1 + a_{22}x_2 + \cdots + a_{2n}x_n &\geqq b_2 \\ \cdots\cdots\cdots\cdots\cdots\cdots & \\ a_{m1}x_1 + a_{m2}x_2 + \cdots + a_{mn}x_n &\geqq b_n \\ x_j &\geqq 0, \qquad (j = 1, 2, \cdots, n), \end{aligned} \tag{2}$$

where the $x_j$ denote the quantities of foods; the $c_j$ denote the caloric content of the foods; the $b_j$ are assorted minimum daily requirements of designated vitamins and minerals; and the $a_{ij}$ denote the vitamin or mineral content with respect to a unit of the $j$th food and the $i$th nutrient requirement.

A simple hypothetical model which can be solved graphically in a two-dimensional Cartesian coordinate system may help to illustrate the problem and its solution. Consider two foods and three nutrient requirements as shown in Table 1. Furthermore, the minimum daily requirements for vitamin $B_1$ and protein consumption are one milligram and 70 grams, respectively. Hence we wish to minimize the objective function

$$z = 30x_1 + 229x_2 \tag{1'}$$

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[2] G. Stigler, "The Cost of Subsistence," *Journal of Farm Economics*, Vol. 27 (1945), pp. 303-314.

[3] Stigler later revised the cost of the abbreviated diet up to $8 per month in 1945 prices. See *The Theory of Price* (New York, 1946), p. 2. Of course, changes of relative prices over the period probably made the diet no longer optimal.

TABLE 1

| Food | Vitamin $B_1$ content (milligrams) | Protein content (grams) | Iron (milligrams) | Calories |
|---|---|---|---|---|
| beef broth (one cup) | 0 | 4 | 0 | 30 |
| pecan nuts (10) | 1/10 | 3 | 4/5 | 229 |

subject to

$$0x_1 + \frac{1}{10}x_2 \geq 1 \qquad (2a')$$

$$4x_1 + 3x_2 \geq 70 \qquad (2b')$$

$$0x_1 + \frac{4}{5}x_2 \geq 10, \qquad (2c')$$

where $x_1$ is the number of cups of beef broth in the diet and $x_2$ (times ten) is the daily intake of pecan nuts. The results are drawn in Figure 1. The inequalities associated with the constraints generate a convex set, S, in two-dimensional space[4] such that all points in S satisfy the inequalities. Constraint (2c′) is immediately noted to be redundant inasmuch as it is automatically satisfied by the more binding (2a′). The optimal solution is found where the objective function is tangent to an extreme point of the solution space S in a southwestern direction, and it is easily seen that the optimal diet consists of ten cups of beef broth and 100 pecan nuts, with a daily intake of 2,590 calories. Fortunately, a larger quantity of foods, even though accompanied by a greater number of constraints, makes it possible to affect substantial reductions in daily calorie consumption, albeit at the cost of a substantial increase in computational difficulties.

### *The Optimal Diet*

It is extremely difficult to determine what constraints should be considered in the model, especially since minimum requirements for some nutrients have never been established. Moreover, available data are likely to be inadequate inasmuch as the vitamin and mineral contents of many kinds of food are apt to be dependent upon the nature of the soil in which they are grown, etc. Finally, these problems are compounded in that some vitamins, particularly the B complex, tend to sup-

[4] Briefly, a convex set S in two-space is defined as a space such that all of the points on a straight line drawn between any two points in the space lie within S. The implications of the paper's title should now be clear to the non-mathematical reader.

plement each other so that in the proper combinations the requirements are less restrictive than when each vitamin is considered as a separate entity.

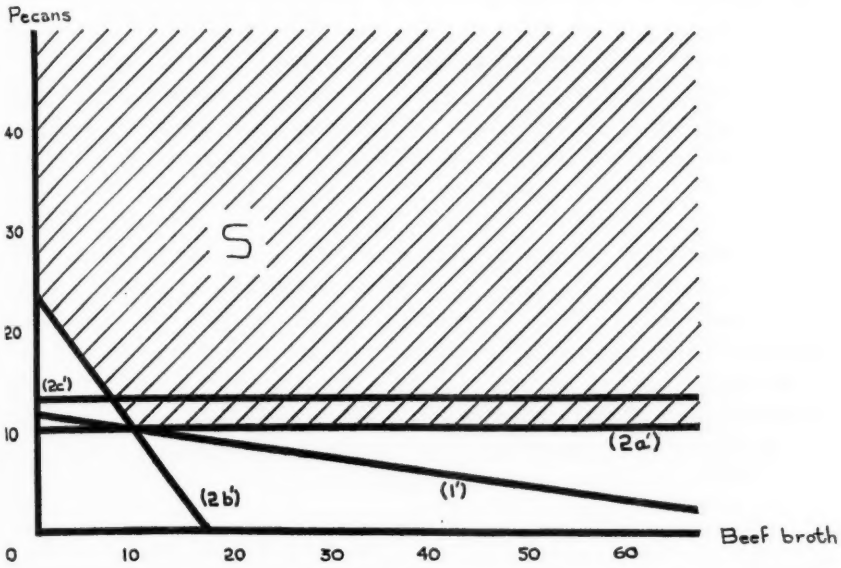


FIGURE 1

Table 2 shows the nutrient requirements included in the problem's constraints and the minimum daily needs with respect to each.[5] At most, therefore, eight foods can be included in the optimal diet, placing a severe strain on the palate of the dieter. A possible escape from this unappetizing dilemma would be to construct the initial model so as to take into consideration a larger variety of foods. This can be done by including within the constraints small non-negative quantities of other foods.[6]

TABLE 2. MINIMUM DAILY REQUIREMENTS

| Nutrient | Minimum daily requirement |
|---|---|
| Vitamin A | 5,000 U.S.P. units |
| Vitamin $B_1$ | 1 milligram |
| Vitamin $B_2$ | 2 milligrams |
| Vitamin C | 30 milligrams |
| Vitamin E | 30 milligrams |
| Calcium | 750 milligrams |
| Iron | 10 milligrams |
| Protein | 70 grams |

[5] The diet is set up on a daily basis because the human body is capable of storing vitamin C only for very short periods of time.

[6] Gass, *op. cit.*, pp. 171-172.

However, the approach to be taken here is that such variety can be taken into account, once the optimal diet is determined, in such a manner so as to set the desired calorie intake at any desired maximum subject to the constraint that the maximum must be at least as large as the minimum solution arrived at by the linear-programming solution.

Almost 400 foods were considered for inclusion into the model. Many were found to be dominated completely by other foods, i.e., to contain smaller quantities of nutrients while having more calories, and were hence dropped from the model. Others were eliminated on the basis of not being available during certain seasons of the year or falling into those categories of foods which are not readily found in neighborhood supermarkets, e.g., Japanese persimmons. Finally, some foods were discarded as being unpalatable.[7] The remaining foods are shown in Table 3. It should be noted that all of the foods contained in the optimal solution of the original diet problem were deliberately included.

Hence the simplex tableau contains eight constraints and 40 variables, including eight slack variables, which were inserted in order to convert the inequalities into equalities and provide an initial basic feasible solution.[8] The optimal daily diet was found to consist of specific quantities of only four foods, namely 14.08 ounces of haddock, 40.3 lettuce leaves, 1.4 cups of cooked turnip tops, and slightly less than $\frac{1}{32}$ cup of wheat germ.[9] The minimal value of the objective function was 349.06 calories per diem. Vitamin and other nutrient contents of the diet are given in Table 4. It is worth remarking that some of the results are substantially above the minimum daily requirements.

If the commercial 900 calorie diets, which have recently occupied prominent places on drug store and supermarket shelves, are accepted as criterion, the above diet has obvious advantages. On the one hand, it contains 550 fewer calories. Secondly, even though consisting of only four foods, it clearly offers more variety than any of the powdered or

[7] The writer confesses to making certain value judgments in this case. Readers who may be placed on a higher indifference curve by the addition to their diet of watercress and barley will undoubtedly wish to formulate their own models.

[8] Impecunious economists and graduate students may wish to add a ninth constraint relating to maximum food expenditures, inasmuch as the above diet would require a monthly outlay of approximately $25, assuming that one is able to acquire turnip tops at no charge from grocery stores. Otherwise, one would be in the position of requesting checkers to twist off the tops and throw the turnips away.

[9] A second-best diet consisted of 14.28 ounces of haddock, 66.2 lettuce leaves, ½ cup of cooked turnip tops, and 0.43 cups of cabbage, with a total calorie count of 349.28. Hence cabbage, which was also included in the optimal subsistence diet, clearly possesses the multiple virtues of high nutritive value, low cost, and slight calorie content.

TABLE 3. FOODS OF THE MODEL

| | |
|---|---|
| beans, dried | dandelion greens, cooked |
| beans, Lima, green, cooked | lard |
| beans, string, green, cooked | lettuce, green |
| beef, lean | liver, beef |
| beet greens, cooked | milk, condensed |
| bread, whole-wheat | peanut butter |
| cabbage, green | peas, fresh, cooked |
| carrots | potatoes, white, baked |
| cauliflower | pork chops |
| cheese, Cheddar | prunes, dried |
| cheese, cottage | spinach, cooked |
| cornmeal, yellow | steak, beef |
| egg, whole | turnip tops, cooked |
| haddock | wheat germ |
| lamb chops | yeast, brewer's diet |

TABLE 4

| Nutrient | Daily consumption |
|---|---|
| Vitamin A | 23,513.34 U.S.P. units |
| Vitamin $B_1$ | 1.00 milligrams |
| Vitamin $B_2$ | 2.60 milligrams |
| Vitamin C | 210.21 milligrams |
| Vitamin E | 47.26 milligrams |
| Calcium | 750.00 milligrams |
| Iron | 13.14 milligrams |
| Protein | 70.05 grams |

liquid commercial preparations. Moreover, hungry economists can add other foods to the minimal calorie diet and remain within a 900 calorie maximum, while those addicted to steak can consume almost ¾ pound of lean beef.

As previously noted, an alternative method of adding variety to the diet is to include minimal daily amounts of certain foods among the constraints. This can be done in such a manner as not to increase the number of variables and constraints over that of the original problem and has an advantage over the approach suggested in the previous paragraph in that the nutrient values of the added foods are included in the optimal solution, hence reducing the required intakes of haddock, lettuce, turnip tops, and wheat germ. At the same time, this technique has the disadvantage of increasing the caloric content of the optimal diet.

Finally, it should be remarked that the solution set is open to the northeast, suggesting that no finite solution exists if the objective function is to be maximized, rather than minimized. Hence those wishing to gain weight can do so without bound unless an additional constraint relating to some maximum capacity is added to the system.

### *The Dual*

Using the previous notation, the dual of the revised diet problem may be written as follows: maximize

$$z' = b_1y_1 + b_2y_2 + \cdots + b_my_m \tag{3}$$

subject to

$$\begin{aligned} a_{11}y_1 + a_{21}y_2 + \cdots + a_{m1}y_m &\leqq c_1 \\ a_{12}y_1 + a_{22}y_2 + \cdots + a_{m2}y_m &\leqq c_2 \\ \cdots\cdots\cdots\cdots\cdots\cdots\cdots & \\ a_{1n}y_n + a_{2n}y_2 + \cdots + a_{mn}y_m &\leqq c_n \\ y_i \geq 0, \qquad (i = 1, 2, \cdots, m). & \end{aligned} \tag{4}$$

Each of the numbers on the right-hand side of the constraints is a price in terms of calories, and the $y_i$ hence may be defined as the caloric price of the nutrients. Therefore, the value of the objective function, $z'$, is the imputed caloric value of the minimal nutrient requirements of the primal, and the dual problem amounts to assigning non-negative numbers to the vitamins and minerals so that the quantity of nutrition obtained in a diet is maximized and never exceeds its cost in calories.

## CORRECTION: PH.D. DEGREES, 1960

The title of the thesis of Lowell Edwin Wilson was incorrectly reported in the listing of Ph.D. degrees conferred in Agricultural Economics in the May issue (43:495). The correct listing should be:

LOWELL EDWIN WILSON, B.S. Murray (Kentucky) State College 1953; M.S. University of Kentucky 1957; Ph.D. University of Illinois 1960, An Analysis of Distribution Costs and Margins for Fluid Milk.

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The American Economic Association, "Index of Economic Journals," Vol. I, 1886-1924, Homewood: Richard D. Irwin, Inc., 1961. Pp. v, 279. Five vol. set—$25.00.

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Guthrie, John A., and George R. Armstrong, "Western Forest Industry," Homewood: The Johns Hopkins Press, 1961. Pp. v, 324. $6.50.

Heady, Earl O., and John L. Dillon, "Agricultural Production Functions," Ames: Iowa State University Press, 1961. Pp. v, 667. $.95.

Hurst, James Willard, "Law and Social Process in United States History," Ann Arbor: The University of Michigan Law School, 1960. Pp. v, 361. (No price.)

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Revzan, David A., "Wholesaling in Marketing Organization," New York: John Wiley & Sons, Inc., 1961. Pp. vii, 656. $10.50.

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Bender, Lloyd D., "The Changing Demand for Beef and Beef Products in Arkansas," Ark. Agr. Expt. Sta. Bul. 636, Jan. 1961, 23 p.

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Blakley, Leo V., and Roger P. Hill, "A Statistical Analysis of the Relationship of Governmental Control Programs and Cotton Acreage in

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"Economic Analysis of Year-Long Grazing Rate Studies on Substation No. 14, Near Sonora," by Leo B. Merrill and Jarvis E. Miller, Tex. Agr. Expt. Sta. MP-484, Feb. 1961, 8 p.

"An Economic Comparison of Poultry Management Systems, 1958-59," by M. Glade Pincock, Dept. of Agr. Econ., Cornell Agr. Expt. Sta. A. E. Res. 60, Feb. 1961, 24 p.

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"Farm Machinery—Own or Hire?," Ore. Agr. Expt. Sta. Circ. of Inf. 604, Jan. 1961, 4 p.

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"The Joint Production Function of Starch Equivalent and Protein Equivalent in Feeding Dairy Cows," by Michael B. Jawetz, Univ. College of Wales, Aberystwyth, 1961, 121 p.

"Labor in Canadian Agriculture," by George V. Haythorne, Harvard Studies in Labor in Agriculture, Harvard Univ. Press, 1960, 122 p.

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"On the Nature of Marketing Margins," by Dana G. Dalrymple, Mich. State Univ., Ag. Econ. 824, April 1961, 13 p.

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"Practices Used in the Production and Utilization of High Quality Forage on Selected New York Dairy Farms," by Norman Rask, B. F. Stanton, and C. W. Loomis, Dept. of Agr. Econ., Cornell Agr. Expt. Sta. A. E. Res. 56, Dec. 1960, 23 p.

"Price Mapping on the IBM-650," by Theo H. Ellis, Auburn Agr. Expt. Sta., Feb. 1961, 66 p.

"The Proposed Two-Price Base Plan for Milk—Criticisms and Comments," by Leland Spencer, Dept. of Agr. Econ., Cornell Agr. Expt. Sta. A. E. Res. 58, Jan. 1961, 11 p.

"Report and Recommendations of the Eighth Meeting of the Economics Research Advisory Committee," Feb. 15-17, 1961, ARS, USDA, 12 p.

"Reporting Egg Prices at Shipping Points in Iowa and Minnesota," by Fred L. Faber, John R. Pedersen, and John O. Gerald, USDA, ARS, MERD, Marketing Res. Rept. No. 445, Jan. 1961, 47 p.

"Resource Requirements, Costs, and Expected Returns; Alternative Crop and Livestock Enterprises; Loam Soils of the Rolling Plains of Southwestern Oklahoma," by Larry J. Connor, William F. Lagrone, and James S. Plaxico, Okla. Agr. Expt. Sta. and FERD, ARS, USDA, Proc. Series P-368, Feb. 1961, 59 p.

"Resource Requirements, Costs, and Expected Returns; Alternative Crop and Livestock Enterprises; Sandy Soils of the Rolling Plains of Southwestern Oklahoma," by William F. Lagrone, Percy L. Strickland, Jr., and James S. Plaxico, Okla. Agr. Expt. Sta. and FERD, ARS, USDA, Proc. Series P-369, Feb. 1961, 55 p.

"Sales, Incentive Payments, and Prices for Texas Wool," by Houston E. Smith, 1959 Marketing Year, Tex. Agr. Expt. Sta. MP-498, March 1961, 13 p.

"Seminar Address: The Farm Credit System," by Marshall H. Edwards, Fla. Agr. Expt. Sta., Agr. Econ. Mimeo. Rept. No. 61-2, Oct. 1960, 28 p.

"The Story of Ten Model Farmers," East Pakistan Academy for Village Development, Comilla, Non-Tech. Pub. No. 14, Jan. 1961, 48 p.

"Studies of Agricultural Production Projections," by Alfred L. Barr, FERD, ARS, USDA, Feb. 1961, 11 p.

"Summary of Cooperative Cases," by Raymond J. Mischler, FCS, USDA, Legal Ser. No. 15, Dec. 1960, 97 p.

"Twenty-Seven Years of Citrus Costs and Returns in Florida, 1931-1958," by Zach Savage, Fla. Agr. Ext. Serv., Econ. Ser. 61-1, Jan. 1961, 31 p.

"Understanding What Goes into Your Food Bill," by Leo R. Gray, MERD, ERS, USDA, April 1961, 10 p.

"World Grain Trade Statistics," FAOUN, 1959/60, 62 p.

# REVIEWS

*Methods of Correlation and Regression Analysis, Linear and Curvilinear,* 3d ed., Mordecai Ezekiel and Karl A. Fox. New York: John Wiley and Sons, Inc., 1959. Pp. xv, 548. $10.95.

This book makes a twofold contribution to the profession: first, a comprehensive and very readable treatment of regression and correlation analysis, and secondly, interwoven throughout the text, a philosophy of research by two noted scholars—the authors.

One measure of the basic value of a book is the number of revisions necessary to keep it current. This is the third revision of Ezekiel's *Methods of Correlation Analysis,* originally published in 1930. The second revision was published in 1941. The present edition is enhanced by the collaboration of Karl A. Fox, as indicated by Ezekiel's statement in the preface: ". . . the senior author has been fortunate in securing the collaboration of an associate who has made distinguished contributions in the newer aspects of the field, particularly in their application to problems of actual research."

The major shift in emphasis in this later edition is toward regression analysis, as indicated by the new title—"Methods of Correlation and Regression Analysis, Linear and Curvilinear." A further shift is that primary consideration is now given to determining regressions with algebraic equations, and less emphasis is placed on graphic or freehand approximations. The limitations of both methods, however, are clearly noted. The order of presentation is improved somewhat, with a grouping of seven major sections.

As before, the book initially reviews basic statistical concepts (e.g., averages, frequency distributions, and measures of dispersion). Then, basic sampling concepts are summarized briefly—with a word of caution from the authors (the first of many): ". . . Computed standard errors tell us how far our results may be off solely because of the chance of getting a poor sample with a limited number of cases; but they do not tell us how far we may be off because of a biased sample, which is not a fair selection from the universe we wish to study."

In the other two chapters of Section I, the meaning of a functional relationship is developed carefully, providing a solid foundation for Sections II, III, and IV, covering simple and multiple (linear and curvilinear) regression. Interestingly, these sections contain detailed discussions on accuracy of estimates, correlation coefficients and indexes, and coefficients and indexes of determination, but tests of significance of regression and correlation coefficients are delayed until Chapter 17 (Section V). This postponement is not especially noticeable until p. 201, where the beef

consumption equation is evaluated in terms of standard errors and other measures.

This reviewer has found, in particular, the detailed discussion of the logic behind the Doolittle Method illustrated for three independent variables (pp. 177-181) to be extremely useful for an undergraduate agricultural statistics class. Another strong feature of the book used as a class text is the attention it gives to economic and "practical" interpretation of statistical measures. In the discussion of multiple regression (Chapters 10-16), the usefulness of modern electronic computers is stressed, but with additional words of caution: ". . . this may mislead him into obtaining results of little reliability or of making analysis without really studying and understanding the various series with which he is dealing."

Section V of the book, with the general heading "Significance of Correlation and Regression Results," includes four chapters. Three (Chapters 17, 18, and 19) have been modernized, and one, "The Use of Error Formulas with Time Series" (Chapter 20), is completely new. Here the authors briefly trace the ups and downs in the last four decades of regression analysis of time series data as a tool in economic research. The excellent works of Wold, Koopmans, and others are cited for redirecting emphasis from the correlation to the regression models and for providing corresponding adjustments in error formulae. Too, calculations of the coefficients of auto-correlation are illustrated (with tables) for the Von Neumann Ratio. A noticeable omission here is the widely used Durbin-Watson test.[1] With respect to these time series problems and present methodology, the authors remain optimistic, but adamant: ". . . Economic statisticians could be excused for making such mistakes in the 1920's and 1930's; in the 1960's they can reasonably be expected to take these problems into account."

A welcome addition to this revision is a section relating analysis of variance to regression problems (Chapter 23). The ANOV technique is illustrated for testing (1) the difference between the effects of two treatments, (2) the difference among the effects of three or more treatments, (3) the significance of additional terms in a simple regression equation, and (4) the presence of curvilinearity of regression.

In another new chapter, "Fitting Systems of Two or More Simultaneous Equations" (Chapter 24), the authors examine the basic logic and mathematics of the simultaneous equations method of estimating economic relationships. Students and even nonmathematical economists should find most readable and enlightening this description of the identification problem and a comparison of structural equations with their least-squares

[1] Durbin, J., and Watson, G. S., "Testing for Serial Correlation in Least Squares Regression," *Biometrika*, 38(1-2), 1951, pp. 159-177.

counterparts. The reviewer admits, however, that familiarity with Fox's writings made reading this chapter somewhat like reading a mystery story after your wife as told you "who dunnit."

The extensive application of regression and correlation techniques to research problems is aptly illustrated by the authors (Chapter 25) with over 200 references—with the added comment that "only a few of the significant statistical studies is any one field have been included." Applications cover the gamut from the well-known production function studies in agriculture to studies estimating appropriate size standards for children's clothes.

A final chapter, on "Steps in Research Work," discusses the place of statistical analysis in scientific research. My reaction to this chapter is that it is out of place in terms of the over-all arrangement of the text; more fittingly, it should serve as the lead chapter of the book, since it embodies so well the central thesis—application of the scientific method to economic research.

The appendix material increases substantially the reference value of the book. Appendix 1 is an easily accessible glossary of the important equations. The familiar "Methods of Computations" (Appendix 2) is modernized somewhat. In addition to an explanation of the Doolittle solution (in terms of the $\Sigma x_i x_j$ matrix), the augmented matrix solution is reproduced in part from the Friedman and Foote publication.[2] Appendix 3 includes some mathematical derivations of selected equations.

My criticisms of this book are minor. Statistical tables (i.e., $F$ distribution, auto-correlation coefficients, etc.) would be more accessible for reference if placed at the back of the book rather than in particular chapters. I am skeptical of an equation on p. 364,

$$X_1 = a + b_2X_2 + b_3X_3 + b_4(X_2 + X_3),$$

which is supposed to have shown good ability to represent joint functions.

The merits of the text are its clarity, simplicity, and practicality in explaining statistical concepts to persons differing widely in previous training—hence, it seems unfair to criticize it for failing to show the full development of formulae and statistical tests. Rather, I would reiterate my previous contention that the profession has gained much from this fruitful collaboration, which provides us with an authoritative text on the senior and graduate level as well as a reference book. It should collect very little dust.

HAROLD O. CARTER

*University of California, Davis*

[2] Friedman, Joan, and Foote, Richard J., *Computational Methods for Handling Systems of Simultaneous Equations*, U.S. Dept. of Agriculture, Agr. Handbook No. 94, Nov. 1955.

*Methods of Regional Analysis: An Introduction to Regional Science,* Walter Isard, New York: John Wiley and Sons, Inc., 1960. Pp. xxix, 784. $9.50.

Among economists, location theory has been a popular subject for many years and interregional studies have enjoyed unusual popularity in the last decade. Agricultural economists have been especially productive with studies of a great variety of products. In making these studies we have had a large body of theory on which to draw but little in the way of operational guidelines as to how to apply that theory to practice. Isard has now given us this much needed aid in regional research.

"Methods of Regional Analysis" is the second in a planned series of three books on the general subject of location analysis. It is best appreciated when used in conjunction with the first volume, "Location and Space Economy." In that volume Isard developed a general location theory, drawing on the works of von Thunen, Weber, Ohlin, Hoover, Losch, Dunn, and others. In the present volume he presents operational techniques of regional analysis, moving from theory to methodology in solving location problems. In the preface (p. xi), Isard indicates that a third volume is contemplated "which not only covers equilibrium with respect to location, trade, price, and production for a system of regions . . . but also treats the fundamental interactions of political, social, and economic forces. . . ." It appears that the author's intent has been to establish first a firm theoretical base and follow with gradual attempts to move closer to reality. In the first and second volumes he has been successful in this endeavor. We will look forward to further progress in volume 3.

The book being reviewed is arranged in a logical manner, opening with the more elementary material and proceeding to the more difficult. Roughly the first half is devoted to a rather detailed discussion of regional estimates considering population projections, migration estimation, interregional flow analysis and balance of payments statements, regional cycle and multiplier analysis, and industrial location analysis. From this he moves to a variety of techniques commonly employed in regional analysis such as input-output, industrial complex analysis, linear programming, and gravity, potential, and spatial interaction models. In each case a rather complete discussion and description of the technique is given with an indication of how it could be used. A lengthy (174 pages) treatment is then given to a comprehensive synthesis of materials presented in foregoing sections, indicating how the individual techniques fit together —how they can be blended in broad regional studies.

It seems clear that the author had two main objectives in writing this book and it is equally clear that he has been successful in attaining both.

The first objective was to present techniques of regional analysis and the second was "to synthesize the strong elements of existing techniques—to develop new, broadened frameworks for analysis" (p. 743). Isard apparently believes the existing partial techniques and the more general interdependence techniques he has presented are inadequate when used individually and that attainment of the second objective represents the main contribution of the book. The reviewer agrees that for a certain number of researchers this synthesis will be most valuable but feels that for the majority of readers the presentation of existing techniques will be by far the most useful contribution. Too few have the resources available, and probably relatively few have the desire, to make the all-encompassing studies visualized in the "new broadened frameworks for analysis."

This is an excellent survey book. It should appeal to a wide range of readers from the least to the most sophisticated. Most of the book is written in a very readable style and at a fairly elementary level. Although other sections of the book are written for more advanced students, sufficient detail is given to enable even the beginner to understand with a reasonable amount of effort. An outstanding feature of the book is its excellent reference list at the conclusion of each chapter.

There is little in this book to criticize unfavorably. The characteristics that may appear to this reader to be weaknesses may appear to another to be strengths. For most of us it is probably excessively long and tends to be overly descriptive in places. While condensation might make it more difficult for some to follow, it would also encourage others to read to completion. The author makes a pointed attempt to give the strengths and weaknesses of each technique presented. This is good. But it would be easy for the reader to conclude that there is little in regional analysis that is not overburdened with weaknesses. A little more emphasis on the fact that, while far from perfection, these techniques are of immense value in helping us understand regional relationships would seem to be appropriate.

This book will almost certainly be adopted as a text in courses in regional science, and certain sections will be valuable as text and reference material for related courses. However, the reviewer has some reservations concerning its value as a text in an agriculturally oriented course and would employ it only for a limited number of selected readings. Its primary value to the agricultural economics profession will probably be as an aid to research.

CARLETON C. DENNIS

*Michigan State University*

*The Structure of a Retail Market and the Market Behavior of Retail Units,* Bob R. Holdren. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1960. Pp. xii, 203. $4.50. (text ed. $1.00).

This volume is one of five doctoral dissertations selected for publication in the first annual Doctoral Dissertation Competition sponsored by the Program in Economic Development and Administration of The Ford Foundation.

The subject field actually is more restricted than indicated by the title, being almost entirely addressed to retail food supermarkets. The first half of the book is devoted to a case study of supermarket food retailing in one small city of about 50,000 persons (which is given the pseudonym "Center City"), and includes the beginnings of a theoretical development. The second half provides construction of an economic "model" and fuller development of the theory.

The work as a whole constitutes a welcome addition to the meager literature dealing with economic theory of food retailing. The author emphasizes the multi-product character of the food retailing operation, and its implications in terms of customer demand, competition, and individual firm policies of pricing and of non-price offer to its customers.

The details of the economic model and the economic theory for the multiproduct retail food firm are developed in chapter 6 through 9. The first two briefly discuss "The Retail Unit's Demand Function" and "The Theory of the Multiproduct Firm." This leads to the two highlight chapters on "The Theory of the Multiproduct Retail Unit: The Theory of Supermarket Market Behavior" and "Variations in the Product Line and the Admissible Set of Non-Price Offer Variations." Chapter 10 is devoted to "Summary and Conclusions," but adds some new analytical material.

The case study section of the book is a familiar ingredient of the standard dissertation recipe. Interpretation and analysis of the observation of supermarket operations are interesting and original, although sometimes appearing rather farfetched, even to the point of reflecting simply the personal bias of the author.

The theoretical development constitutes the principal contribution by Dr. Holdren. In his Introduction (p. 7) the author states, ". . . no reasonably adequate model of the retail unit exists. Retail units are multiproduct concerns. Their output may be considered as service for certain purposes, but the retail service is inextricably linked to a wide range of commodities. Thus, the behavior of retail units can be adequately described only by a multiproduct model."

The concluding words of the book are: ". . . Loss leader selling as a logical outcome of retail complementarity has escaped most of the writers on retailing. Once product discrimination is admitted and it is

realized that such discrimination is the price paid for a reasonably competitive retail market, an entirely different view of so-called loss leader selling is necessitated. Further product discrimination would exist even in a perfectly informed market and, therefore, the existence of loss leaders is not prima facie evidence that unwary buyers are being misled [sic] by deceitful sellers."

Within the multiproduct supermarket operation, Dr. Holdren distinguishes three groups, classes or types of products. The "*K*-class" products are those priced by decision of the firm which are capable of producing a "transfer effect" in terms of consumer demand for products of the firm. "Transfer effect" is the change in store sales resulting from a transfer of patronage between stores without change in pattern or quantity of consumer purchases (defined in footnote 11, page 122). The *K*-class products appear to comprise those commodities often called "traffic-builders."

A second "Theta-class" of products are those possessing no "transfer effect," but also priced by decision of the firm. (Footnote 1, page 135.)

The third "Lambda-class" consists of all price-fixed commodities, whose prices are not affected by decisions of the firm.

The author argues that certain commodities of the *K*-class are selected by the firm for reduction of prices and margins in order to attract patronage and to capitalize upon their transfer effect. Unique products like coffee tend to be selected by all firms, and they become market-wide leader items. Selection of other *K*-class items for price reduction and special promotion often differs from firm to firm, to give each a differentiated status in the eyes of the consumer. He argues that competitive pressures force down the general margin and price level of the *K*-class items relative to other commodities. Dr. Holdren goes into considerable detail to develop logical criteria which should guide the firm's choice of items to promote out of the *K*-class of commodities.

Inter-product cross demand elasticities in the multiproduct firm are the basis for price and margin adjustments departing from alternative structures for single-product firms.

Decision variables available to the retail firm include various aspects of non-price offer. The quantitative degree to which each such aspect is applied by the firm is denoted by subscript *a*'s in the author's notation, and these constitute principal variables in the consumers' demand functions for products sold by the store.

In treating the cost structure of the firm, the author adds to the usual two categories of fixed costs and variable costs a third, regrouped category of "Discretionary Fixed Costs" that appears to borrow from both the others. They are defined as costs which do not vary with output, but are discretionary in the short run. The author takes special pains to show that

nearly all labor costs belong in this discretionary category, and should not be treated as variable. This leads him to conclude that increases in wage rates and labor costs are not legitimate reasons for decisions to increase margins and prices. Another consequence is to reduce the variable cost category for the retail store to a very small share of total costs.

Costs of various aspects of non-price offer also become elements of discretionary fixed costs.

The mathematical model developed in the book does little to dispel the popular opinion that economic models resemble a magician's hat—what is quietly put in under one guise can be taken out again under another, with appropriate fanfare. Insistence upon linearity sometimes predetermines the character of the result.

This reviewer encountered a variety of annoyances chargeable to faults in organization and exposition. Terms and concepts often are introduced without definition or adequate explanation. Important definitions are sometimes found in fine-print footnotes far removed from first introduction of the terms. Cross-references are few. There is no index. Text discussion often proceeds in terms of notational symbols per se, without labeling, redefinition or cross reference. The model notation appears unnecessarily proliferous. Occasional two-letter notation may be confused with algebraic products. There are a number of typographical errors, particularly in the formulae.

Regardless of its faults, the book is a commendable venture into an important applied field of economics, which should exert a significant influence upon other economists who continue the exploration.

RICHARD O. BEEN

*Safeway Stores, Inc.*

*Physical Distribution Management,* Edward W. Smykay, Donald J. Bowersox, and Frank H. Mossman. New York: The Macmillan Company, 1961. Pp. xiv, 283. $6.00.

The obvious purpose of this book is to make a case that physical distribution management should have its place in the sun. Physical distribution is defined by the authors as "That area of business management responsible for the movement of raw materials and finished products and the development of movement systems." The rationale for writing such a book at this time is based on three recent developments: New electronic equipment for processing the detailed information involved in distribution problems, the rapid rise of inter-city freight rates with their influence on nationwide marketing firms, and legal rulings which cast doubt on different pricing plans in distribution.

The book gives the impression that here at last is a comprehensive

treatment of one of the more neglected areas of marketing research. Unfortunately, it falls short of treating this subject in the depth and rigor which it deserves.

The audience for this book is difficult to define. Presumably it is at a level appreciated by the somewhat inexperienced company foremen and possibly by some lower level company executives. The professional agricultural economist will find limited use for it. Graduate students working on specific distribution problems may find it of some value, and the more affluent departmental libraries may want a copy. It is readable and will probably have rather good reception for certain industry uses.

Agricultural economists will appreciate that the book uses a much broader marketing concept than most non-agricultural business management treatments. The reasons for having a book in this area are legitimate and generally well spelled out, although they lack some things in over-all perspective. Certain sections of the book, such as Chapter 3 on "Structure for Product Flow-Transportation," may be useful for professional economists and others as a type of handbook on certain types of transportation information. The book is referenced quite widely, and some of the sources may be useful although some are already dated, and there are serious omissions.

In the attempt to weld this very large subject matter together, the authors create the basic weakness of the book. They are fair to point out that they do not expect everything in the book to be new, but they hope the coverage of this knowledge in an integrated system will be new and unique. This has left them in the unfortunate position of going so broadly to collect relevant materials that they do not have pages enough to go into depth on any particular part. There is an instance here and there where they have drawn on research in depth, but generally speaking, the book is shallow in treatment of each particular subject matter area.

It is uncomfortable for an applied economist to read this book. At several places the authors infer the breach between theory and practice and write as if they thought this dichotomy was naturally broad. In no place do they try really to develop a continuum of thought. Their use of rules of thumb, check lists, lists of advantages and disadvantages and other means of generalization appear in cases to be somewhat dangerous. They have over-generalized to the point that many interested readers may be misled. Moreover, they tend to ride too hard the total cost concepts of accounting for modern day decision making theory. One of the more disturbing theoretical questions about the book is its tendency to put undue emphasis on factors external to the firm so far as they affect distribution, in contrast to more recent thought such as that of Cleland, who suggests that we have probably slighted the internal factors and the power of the

management team in the management process.[1] It is probably too much to expect complete continuity when the authors attempt to move from von Thünen to detailed descriptions of work methods and employee policies for warehouses. Yet, one would hope that the dichotomy between theory and practice would not be so broad.

It is disappointing that the book implies that it is modern in focus. Even in its rather extensive descriptive phases much is already dated. Serious omissions exist in more modern quantitative thinking. It many times infers that certain things could be done with modern quantitative technique but never actually shows the more sophisticated and powerful quantitative techniques being considered by industry. Evaluation needs here cry for a book which this one might have been. Particularly slighted is applied statistics in the form of simulation techniques and such. Many hope these may be our most powerful tools for the troublesome distribution problems which have caused management to shun this area.

The book is a bit sloppy editorially. It pulls together loosely some rather disconnected pieces. Often this seems to be an attempt to use research and theses in which the authors have a personal vested interest. A rather irritating amount of excessive editorial explanation exists. For instance, the authors continue to explain why they have done something or have not done something in this particular section or that. The case descriptions are not overly convincing and do not add materially.

CHARLES E. FRENCH

*Purdue University*

[1] Cleland, Sherrill, *Linear Programming and the Theory of the Firm*, Macmillan Co., New York, 1960, pp. 202-07.

*Economics of Watershed Planning*, G. S. Tolley and F. E. Riggs. Ames: Iowa State University Press, 1961. Pp. 339. $3.95.

This volume is the proceedings of the Symposium on Economics of Watershed Planning, held in Knoxville, Tennessee, in June of 1959 under the sponsorship of the Southern Land Tenure Research Committee, Farm Foundation and TVA. The book is another of the valuable contributions which the regional committee has made. The book also reports on one of the distinguished series of symposiums sponsored by the TVA and Farm Foundation in recent years.

The subject is surveyed in 20 chapters by as many authors, for the most part outstanding experts in their fields. Nearly every chapter includes also the comments of at least one reviewer. The result, as in all such collections, is some considerable unevenness, but in spite of this, the book belongs on the shelf of any serious student of watershed development. Although focused primarily on economics, it is by no means only for

economists. The first seven chapters of the book constitute a survey of some general policy problems in watershed development. S. V. Ciriacy-Wantrup examines some of the objectives of watershed policy and again demonstrates his support for conventional cost-benefit ratios. Fletcher Riggs has a thoughtful chapter on the watershed as an entity for planning. The best of these first chapters by far is the one contributed by Ayers Brinser. He presents a set of themes that lend perspective to the main areas of controversy in watershed planning and evaluation.

A second group of chapters reviews the state of the data currently available for watershed planning, examines the economic underpinning of present methodology for planning and evaluation, and gives a preview of the future possibilities of the application of some fairly sophisticated methods of economic analysis to watershed planning problems. The chapter by George Tolley and Ralph Freund, Jr., will be both disturbing and enlightening to engineer-readers. The double chapter by E. O. Heady and Robert Dorfman is a tantalizing but unsatisfying taste of what we might expect if some of the relatively new methods of analysis are adapted to watershed planning. Three other chapters report on applications of linear programming in watershed studies.

The final group of chapters deal with legal and institutional problems in watershed development. The chapter by Robert Lowry is recommended reading, especially for those concerned with watershed development policy. His criticism of the fragmentation tendencies inherent in P.L. 566 deserves thoughtful consideration. Also, his plea should be heeded for a broader perspective in watershed planning, encompassing relations between small watersheds and large river basins, and for recognition of the need for a concept of total water management as the foundation stone for planning activities. Harold Ellis' chapter on water rights will surely be a well-read general source on this subject.

JOHN BLACKMORE

*University of Massachusetts*

*Water Resources Activities in the United States,* Select Committee on National Water Resources, United States Senate, 32 Committee Prints, Washington: Government Printing Office, 1960. Pp. 2000.

A 1959 Senate resolution requested information on the character and extent of water resource projects that will be needed to supply the future water requirements of the major water uses in the United States. This has resulted in the preparation of 32 staff reports for the U.S. Senate Select Committee on National Water Resources.

The first group of reports provide background materials on past water development activities, current problems, physical water resources, and population and economic activity projections. The second group includes

detailed projections of future needs for each use, including agriculture, municipalities, industry, pollution abatement, power, navigation, fish and wildlife, and recreation. Included in the third group are reports on techniques for meeting needs, such as weather modification, saline water conversion, and reuse.

The demand projections are probably of most interest to agricultural economists. The water demands enumerated are not used in the same sense as an economist regards demand, namely, a schedule of quantities demanded at different prices. Rather demand is used in the sense of physical requirements based on postulated economic activity. The methods of achieving these projected needs for the years 1980 and 2000 are of particular interest since they affect the data's usefulness.

Essentially the demands for the major uses, including agriculture, were computed using three levels of projected population. This was combined with water use per capita or per unit of production based on current uses and trends. In the case of pollution abatement needs, a certain water quality standard was assumed. Foreseeable technological input-output changes were acknowledged. However, little attention was given to price-cost relationships which could change the use of water as compared with other productive inputs. For example, demand for irrigation water would depend on the relative cost of other types of land development such as grass or forest conversion and drainage. However, the basis for the chosen level of irrigation versus other types of development was not shown.

The reports assumed that failure to incorporate demand elasticities was not serious since it was felt that they are highly inelastic. However, since much water is now used free or at low prices the increase in price in the future can be expected to be proportionally large. Thus, even with low elasticities, the absolute change in quantity demanded could be large.

The most significant shortcoming of the reports is that many of the projections of water needs already have implicit in them policy decisions on allocation and pricing which are supposed to be the questions up for evaluation. One author recognizes that the reports do not answer the committee's question on what levels of expenditure are justifiable for future water development. However, the conclusions are presented in terms of the gap between projected needs and available supply with least cost combinations of various levels of water treatment and flow regulation through storage to fill this gap. Stated in this manner the problem appears to be one of finding the correct means to fill the gap, which covers up the need to evaluate the allocation and pricing relationships which were assumed in computation of the projected needs.

The scope of the task to which the reports are addressed shows up the general lack of information needed to make intelligent national water de-

velopment policy. In this regard, the reports should not be too severely criticized. However, their limitations for purposes of economic analysis should be recognized. Several directional policy steps are indicated whose validity does not depend on meeting the specified quantitative projections of water needs. In addition, the basic economic projections of population and economic activity in the reports are a valuable source of materials for researchers for a variety of purposes.

A. ALLAN SCHMID

*Michigan State University*

*Criteria for Fixation of Water Rates and Selection of Irrigation Projects,* The National Council of Applied Economic Research. New York: Asia Publishing House, 1959. Pp. xi, 156.

This discussion of investment and pricing criteria for public water projects is a policy review paper. Brief theoretical argument and a fairly well-developed case study of a particular canal system provide reinforcement in arguing for changes of investment and pricing criteria used by the Indian government. The work is divided into two sections dealing with these subjects separately. Its primary contribution lies in the corroboration of studies elsewhere in the profession rather than its precision of theoretical argument or exhaustiveness in case study.

The main argument of the first section attacks the present "productivity" criterion for public investment, which corresponds to the yield rate used in assessing private investment opportunities. The theoretical support summoned fails to cut very deeply, but certain adverse consequences of applying this criterion are explicitly analyzed by reference to a 25-year-old development project—the Sarda Canal System in Oudh, U.P. These include inefficient project formulation, poor investment timing, prevention of management programs for integrating ground and surface water use in the service area, and the failure of public water development projects to be used as a counter cyclical device for the general economy. A number of hypotheses are implied in this discussion that would provide fruitful bases for further analysis. The first section of the study ends with the listing of several measures of benefits in relation to costs along with the recommendation that all be considered in the process of project evaluation and selection. Unfortunately, the key implication of the suggestion—namely, a basic reformulation of economic justification criteria—is not developed in detail.

The second main part of the study considers water pricing. As these decisions have been made on largely *ad hoc* bases, no particular national policy provides a focus as was the case in the first section. Rather, certain general problems are posed and deficiencies of current practices employed by the Sarda Canal System are discussed. Cost-based pricing is

contrasted with a method that would fix prices in relation to benefits received. The Council favors the latter and outlines certain operational standards that could be invoked for its application, including appropriate administrative organization.

This reviewer found the discussion of pricing in relation to a number of institutional factors most instructive. Consideration of water charges in relation to the general tax structure, to organizational arrangements for project administration, and to local distribution systems are distinctly helpful and possess general applicability. The recommendations with which this part of the book concludes directly reflect these factors.

This appraisal adopts a broad point of view in examining these policy problems. Recognition of the futility of seeking a utopian set of investment criteria with universal applicability is refreshing, as is the importance attributed to the institutional context within which such investment is undertaken and projects actually function. The frequent tacit assumption that a full-fledged irrigation economy is created by the construction of a dam and trunk canal facilities (often depicted as a miniature Tennessee Valley Authority by economic analysts) is directly refuted. In this reviewer's opinion, these attributes of the book outweigh its analytical shortcomings, frequent repetition of argument, and awkward expression.

The largest deficiency in the study, and one with significant analytical implications, is the failure to synthesize its two parts—to develop the inter-relationships between financing and pricing practices on the one hand and project evaluation and selection on the other. Although it is suggested that these problems are simultaneous, the text does not reinforce this claim with substantive development.

The volume will provide a basis for student provocation if used as collateral reading at the graduate level. The case study, cited references, and three appendices on cost measurement, irrigation benefit estimation, and regional statistics for Indian irrigation projects will be useful for research purposes.

MICHAEL F. BREWER

*University of California*

# NEWS NOTES

MARTIN, E. ABEL, who received his Ph.D. degree at the University of Minnesota in June, has accepted a position as Analytical Statistician with ERS in Washington, D.C.

GERALD E. ACKERMAN, formerly with the Economics Branch, Alberta Department of Agriculture, joined the Department of Agricultural Economics and Farm Management, University of Manitoba, as a Research Associate on April 1st.

MELVIN ALLEN, formerly on the staff of the Department of Economics, Mississippi State University, is now a cooperative agent with the Marketing Economics Division, ERS, and Georgia Agricultural Experiment Station. He is stationed at Griffin, Georgia.

A. T. ANDERSON, Associate Professor of Agricultural Economics at the University of Illinois, will retire September 1.

LESTER L. ARNOLD, formerly Extension Economist in Farm Management, Ohio State University, has accepted an appointment as Agricultural Economist with the Research and Information Division, Farm Credit Administration, Washington, D.C.

JACK ASCHWEGE transferred from the State Statistician's Office in Nebraska to the Field Crop Statistics Branch, Agricultural Estimates Division, SRS, effective March 20.

JOE ATCHLEY, Land and Water Economics Branch, ERS, is now stationed at Columbus, Miss., where he will work with the USDA Work Plan Party, the Mississippi Board of Water Commissioners, and the Alabama Water Resources Study Commission on a survey of the Tombigbee River Basin.

RALPH L. BAKER, Pennsylvania State University, has accepted appointment as Professor in Poultry Science at Ohio State University, effective September 1. He will hold a joint appointment with the Department of Poultry Science and the Department of Agricultural Economics and Rural Sociology.

ANDREW E. BARRETT has been promoted to Special Assistant to the Deputy Minister of Agriculture, Ottawa. Mr. Barrett formerly was Assistant to the Director General of the Research Branch of the Department and before this he served as Chief of the Illustration Stations Division of the Experimental Farms Service.

DONALD W. BARROWMAN transferred from the Washington State Statistician's Office to the Washington staff of the Fruit and Vegetable Statistics Branch, Agricultural Estimates Division, SRS, effective March 19.

EDWARD J. BELL, formerly Agricultural Attaché at Athens, Greece, has returned to Washington as European Area Officer in the Foreign Agricultural Service, USDA.

CHARLES BENRUD, South Dakota State College, was granted a National Science Foundation Fellowship to attend the Summer Institute in Statistics at Iowa State University. He has been granted a sabbatical leave for the 11-week session.

LLOYD W. BERGSMA, Livestock Marketing Specialist with the Texas Agricultural Extension Service, on May 1 joined the Southwest Cattleman's Association at Fort Worth, Texas. Mr. Bergsma is on a leave of absence for one year from his duties with the Extension Service.

ROBERT BEVINS, assistant professor in extension public policy at Michigan State (during Gar Wood's absence) is resigning to accept a research-extension position in public policy at Kansas State, effective July 1, 1961.

JOHN BLACKMORE, Head of the Department of Agricultural and Food Economics, University of Massachusetts, has been invited by the Merrill Center for Economics to participate in its forthcoming seminar on International Economic Development.

OSWALD P. BLAICH, who has completed the requirements for the Ph.D. degree at the University of Minnesota, has accepted a position as Associate Agriculturist, Giannini Foundation, Berkeley.

RICHARD A. BLOOD, Land and Water Economics Branch, ERS, has shifted his headquarters to Little Rock, Ark., where he will work with Nathan G. Mallett on economic studies of the Department's small watershed program.

BYRON R. BOOKHOUT has transferred from the State Statistician's Office at Louisville, Ky., to the Field Crops Statistics Branch, Agricultural Estimates Division, SRS.

HOWARD BOSSART transferred from Virginia to the Washington staff of the Crop Reporting Board, SRS, effective March 24.

DON BOSTWICK, Farm Economics Division, ERS (stationed in Montana), was a recent recipient of a USDA Certificate of Merit and cash award.

JOHN BRAGG, Assistant Professor at the University of Massachusetts, will spend a sabbatic year at the University of Indiana. He will study in the field of management.

KARL BRANDT has resumed his duties at the Food Research Institute, Stanford University, after serving two years as a member of President Eisenhower's Council of Economic Advisers.

HARRISON M. BRYCE, Auburn University, has resigned as Assistant Agricultural Economist to enter private business.

MARGUERITE C. BURK has resigned from the Economic Research Service, USDA, to accept a professorship at the University of Minnesota, a joint appointment with the Department of Agricultural Economics and the School of Home Economics.

ALVIN BURNETT has joined the Department of Agricultural Economics, Ontario Agricultural College, as Assistant Professor in marketing. Mr. Burnett has been a member of the research teams of the Canadian Royal Commission on Price Spreads and the Ontario Agricultural Enquiry Committee.

WILFRED CANDLER has been appointed Professor of Agricultural Economics and Farm Management and head of department at Massey Agricultural College, Palmerston North, New Zealand.

REYNOLD E. CARLSON, of Vanderbilt University, will spend the academic year 1961-62 in Brazil where he will be attached to the Vargas Foundation.

HOMER CARTER transferred from the State Statistician's Office in Texas to the Virginia State Statistician's Office on April 2.

BOB CHRISTESON has transferred from the State Statistician's Office of Indiana to the Washington Office of the Agricultural Estimates Division, SRS.

YAO H. CHUANG has joined the staff of the Tennessee Valley Authority, having completed his Ph.D. in agricultural economics at the University of Illinois.

J. M. COWDEN has retired from his position in the Dairy Branch, Marketing

Division, Farmer Cooperative Service, after 32 years of service in the Federal Government.

CLIFTON B. COX has resigned his professorship at Purdue University to become Director of Economic Research for Armour & Company at Chicago.

J. B. CUNNINGHAM, Professor of Farm Management in agricultural economics at the University of Illinois and manager of the University of Illinois endowment farms, will retire September 1.

JACK R. DAVIDSON, of the Montana State College staff, received a Post-doctoral Resident Research Associateship award for 1961-62 in the USDA Pioneering Research Laboratories. His Associateship is in the Pioneering Research Group in Interfirm Integration in Farming, of the Farm Economics Division, ERS. E. P. ROY of Louisiana State University was named as alternate.

LEE M. DAY was appointed Regional Analyst with the Farm Economics Research Division, ERS, Washington, D.C., effective July 1. He was formerly Agricultural Economist, FERD, and Associate Professor of Agricultural Economics at the University of Minnesota.

PAUL D. DOAK has been appointed a Research Associate in the Department of Economics and Sociology at Iowa State University.

JAMES DUMAS transferred in May to the Marketing Economics Division, ERS, from the Bureau of the Census.

JOHN A. EDWARDS, formerly Assistant Professor of Agricultural Economics at the University of Idaho, joined the staff in Agricultural Economics at Oregon State University on July 1 as Assistant Professor. He will teach and research in the area of demand and price analysis.

W. DONALD R. ELDON, of the University of Western Ontario, Department of Economics, was appointed to the Canadian Tariff Board for a 10-year term beginning May 15.

DUANE E. ERICKSON has accepted a position for one year as Extension Economist in Farm Management at the University of Minnesota.

MORDECAI EZEKIEL, formerly Assistant Director-General in charge of the Economics Department of the Food and Agriculture Organization of the United Nations, has been appointed special assistant to the Director General for economics affairs. He has been associated with FAO since its inception, and became Deputy Director of the Economics Division in 1951 and head of the Economics Department in 1959. He was formerly on the staff of USDA, which he joined in 1922, and where he was Economic Adviser to the Secretary from 1933 to 1944. Dr. Ezekiel will remain in Rome in his new post.

RALPH FELBERG, South Dakota State College, has been granted a sabbatical leave for graduate study at the University of Missouri for the 1961-62 school year.

GEORGE M. FERRELL has transferred from the Washington, D.C., Research and Development Staff, SRS, to the State Statistician's Office at Louisville, Ky.

KARL A. FOX, Professor and Head of the Department of Economics and Sociology at Iowa State University, returned June 1 from Harvard University where he served as Visiting Professor of Economics during the 1960-61 academic year.

HAROLD T. FREY, Geographer, has joined the Washington, D.C., staff of the Farm Economics Division, ERS.

JOHN F. FRITSCHEN, Farm Economics Division, ERS, recently received a USDA Certificate of Merit and cash award.

WALTER GENSUROWSKY has been appointed a Research Associate in the Department of Economics and Sociology at Iowa State University.

NICHOLAS GEORGESCU-ROEGEN, of Vanderbilt University, will serve as a Vanderbilt-Overseas Professor during the year beginning February 1, 1962, dividing his time between Osaka University and Hitotsubashi University.

J. C. GILSON, Department of Agricultural Economics and Farm Management, University of Manitoba, will be Acting Head of the Department of Agricultural Economics for the next year.

RICHARD J. GOODMAN, who has completed the requirements for the Ph.D. degree at the University of Minnesota, has accepted a position as Extension Economist in Public Affairs and Public Policy at North Dakota State University.

J. C. GRADY has been promoted to the rank of Associate Professor of Agricultural Economics at the University of Missouri.

RICHARD E. GRUBB, who completed requirements for the M.S. degree at Penn State in June, has joined the Tyrone Milling Company, Tyrone, Pennsylvania, as a partner.

CONRAD H. HAMMAR was Visiting Professor in Agricultural Economics at the University of Minnesota during the spring quarter.

H. H. HANNAM and DAVID KIRK, President and Secretary-Treasurer of the Canadian Federation of Agriculture, were members of the Canadian delegation to the twelfth general conferences of the International Federation of Agricultural Producers at Dubrovnik, Yugoslavia, in May. The conference studied contract farming and farmer cooperatives.

ALVIN HARPER has returned to the staff at Louisiana State University after two years of graduate study at Purdue University.

MARSHALL D. HARRIS, of the Farm Economics Division, ERS, and the Agricultural Law Center, Iowa City, Iowa, received a USDA Superior Service Award on May 23 "for executing outstanding research on farm tenure, organizing and stimulating State and regional land tenure research, and initiating interdisciplinary studies in law and economics which contributed to greatly improved tenure policies and practices."

PAUL R. HASBARGEN has been granted a one year leave from his position as Extension Economist in Farm Management at the University of Minnesota. He will take further graduate work at Michigan State University.

DALE HATHAWAY will be on leave of absence from Michigan State University from Oct. 1 to June 30 to serve as visiting Professor of Economics at the University of Chicago.

GEORGE V. HAYTHORNE, assistant deputy minister of the Department of Labour, Ottawa, since 1953, has been appointed deputy minister of the department.

R. BURNELL HELD, of Resources for the Future, Inc., is Visiting Lecturer in the Department of Economics at the University of Colorado, Boulder, for the second summer term.

BOB HOLDREN has been promoted to Associate Professor in the Department of Economics and Sociology at Iowa State University.

JOHN W. HUBBARD, University of Kentucky, will join the Department of Agricultural Economics, Clemson College, as an Assistant Agricultural Economist in September.

HARVEY M. HUTCHINGS joined the staff at Oregon State University as Assistant Professor of Agricultural Economics, effective July 1. He will be researching in the area of interregional competition. For the past three years he had been an ERS cooperative agent.

ARMIN G. JANZ has transferred from the State Statistician's Office at Madison, Wis., to the State Office at Lansing, Mich.

ELMAR JARVESOO has returned to his post at the University of Massachusetts following a year of sabbatic study at North Carolina State College.

GLENN JOHNSON was on leave from Michigan State during June and July to advise on economic aid in Thailand.

BRUCE F. JOHNSTON, of the Food Research Institute of Stanford University, returned in June from an assignment with the Food and Agriculture Organization in Rome, where he prepared a report on food supplies and food consumption in Africa in connection with FAO's Third World Food Survey. In addition to this assignment, he visited the UN Economic Commission for Africa at Addis Ababa; the University College of East Africa, at Kampala, Uganda; and Nairobi and the Royal Technical College in Kenya. Mr. Johnston will be a member of Stanford-in-France at Tours for two quarters of the academic year 1961-62, after which he will spend four months at the University College of East Africa at Kampala, Uganda.

EVAN JONES, Statistician-in-Charge in Arizona since October 1944, retired for reasons of health on March 20. Mr. Jones began his work with USDA in 1929 in the Federal-State office in Lincoln, Neb. In 1936 he became Statistician-in-Charge of the Brookings, S.D., office, and later the Sioux Falls office.

MAX F. JORDAN joined the staff of the Rural Development Branch of the Farm Economics Division, ERS, at Fayetteville, Arkansas, upon completion of his work for the Ph.D. at the University of Illinois.

KUMUD KARNIK has returned to India, after completing her Ph.D. at the University of Missouri, and is employed by the Reserve Bank of India, Bombay.

EARL KEHRBERG, Purdue University, left on July 1 for a year's sabbatic leave as visiting professor at Landwirtschaftliche Hochschule Hohenheim, Stuttgart-Hohenheim, Germany.

PAUL L. KOENIG, Assistant to the Deputy Administrator, SRS, retired in June after 39 years in USDA, most of it with the Crop Reporting Board, Agricultural Estimates Division.

NICHOLAS KOMINUS, formerly Acting Chief of the Publications Branch, Division of Information, Agricultural Economics, in USDA, and Editor of the *Agricultural Situation*, has taken a position with the U.S. Cane Sugar Refiners' Association.

LEO F. KRISTJANSON has been appointed to the staff of the Center for Community Studies of the University of Saskatchewan, Saskatoon.

LAWRENCE A. LOSLEBEN has transferred from the State Statistician's office at Sacramento, Calif., to the Fruit and Vegetable Statistics Branch, Agricultural Estimates Division, SRS.

J. PATRICK MADDEN has been appointed Collaborator with the Farm Economics Division, ERS, stationed in the Department of Economics and Sociology at Iowa State University, where he is also continuing his graduate work.

FRED MANN, University of Missouri, is in England at Cambridge University to complete his Ph.D. program in Agricultural Law.

L. B. MANN, who had been Chief, Frozen Food Locker Branch of Farmer Cooperative Service for the past 16 years, retired on April 28. He served in the Department of Agriculture for more than 34 years.

J. K. MCDERMOTT, of the Agricultural Economics staff at Purdue University, is joining the Purdue team at Universidade Rural Do Estado De Minas Gerais, Vicosa, Minas Gerais, Brazil. He will be in Brazil on this program for two years, and joins there his Purdue colleague D. WOODS THOMAS.

ROBERT A. MCGREGOR has transferred from the Fruit and Vegetable Statistics Branch, Agricultural Estimates Division, SRS, to the State Statistician's Office at Sacramento, Calif.

DEAN MCKEE will transfer during the early fall from Michigan State to Iowa State. An employee of the USDA, he will become Leader, Corn Belt Adjustment Investigations.

H. D. MCRORIE, farm management specialist with the agricultural representatives branch, Saskatchewan Department of Agriculture, since 1958, has been appointed supervisor of the Farm Management Division of the branch.

CHARLES O. MEIBURG, formerly Assistant Professor of Economics at Ohio Unisity, was appointed Research Associate at the Food Research Institute, Stanford University, last February 1.

JAMES O. MELTON has joined the Mutual of New York as trainee in the farm mortgage department, having completed his M.S. in agricultural economics at the University of Illinois.

WALTER G. MILLER, Farm Economics Division, ERS, recently received a USDA Certificate of Merit and a cash award.

MARVIN P. MIRACLE has been appointed Research Associate in the Food Research Institute of Stanford University. He will undertake a study of traditional agricultural methods in equatorial Africa, in association with W. O. Jones.

GLEN H. MITCHELL has left Ohio State University to become Director of Economics and Marketing Research with the Indiana Farm Bureau Cooperative Association in Indianapolis.

L. ERNEST MOBERG resigned in June from the Soil Conservation Service Watershed Planning Unit at Phoenix, Arizona, to become Associate Economist in the Division of Soil Conservation, California State Department of Natural Resources, at Sacramento.

OTTO MORGENSTERN, Assistant Professor of Economics at the University of San Francisco, was Visiting Assistant Economist in the Food Research Institute of Stanford University for the summer quarter, associated with R. J. Hammond in a study of the economics of Portuguese Africa.

RALPH NELSON, South Dakota State College, has been promoted to the rank of Associate Professor.

RICHARD R. NEWBERG, Ohio State University, was in Central and South America from June 1 to August 1 planning for an Agricultural Marketing Seminar to be held in Brazil in the winter of 1962.

WILLIAM H. NICHOLLS, of Vanderbilt University, will serve during the academic year 1961-62 as Visiting Professor of Economics at Harvard University.

JAMES NIELSON was promoted to professor at Michigan State University, effective July 1.

KENNETH C. NOBE, formerly with the Farm Economics Division, ERS, has transferred to the U. S. Public Health Service.

FRANCENA L. NOLAN resigned from the Department of Agricultural Economics and Rural Sociology at Pennsylvania State University on July 1 to accept appointment as Director of the Division of Home Economics, College of Agriculture, Forestry, and Home Economics, at University of West Virginia.

JOHN A. NORDIN has resigned from his position as Professor in Charge of Instruction in the Department of Economics and Sociology at Iowa State University to become Head of the Department of Economics and Sociology at Kansas State University.

DENNIS OLDENSTADT, who is completing his degree at Michigan State, accepted an appointment beginning July 1 with ERS as a Cooperative Agent stationed at East Lansing. He will be doing price analysis on various fruits.

RUSSELL O. OLSON, Ohio State University, will become Chief of the Land Use and Farm Management Branch of Land and Water Development Division of the Food and Agriculture Organization of the United Nations August 15. He will be stationed in Rome, Italy.

DONALD L. OSBUN, formerly with the Farm Economics Division, ERS, has transferred to ITCEC, Wright Patterson AFB, Dayton, Ohio.

WILLIAM C. PADDOCK has joined the staff of the Economic and Statistical Analysis Division, ERS, where he will work in the Dairy and Poultry Section.

HOWARD L. PATTERSON, Director of the Farm Economics and Statistics Branch, Ontario Department of Agriculture, is the new President-Elect of the Agricultural Institute of Canada for 1961-62.

WILLIAM C. PENDLETON, Farm Economics Division, ERS, has been awarded by Resources for the Future, Inc., one of its seven fellowships for doctoral dissertations in the field of urban economics. His thesis is "Land Values and Highway Benefits," at the University of Chicago.

B. H. PENTECOST has left the Farm Supplies Branch of Farmer Cooperative Service to accept a position in the Foreign Agricultural Service in the Department of Agriculture.

CHARLES H. PERCIVAL has transferred from the State Statistician's Office at Salt Lake City, Utah, to the State Office at Seattle, Wash.

C. V. PLATH, presently on leave from his position as Associate Professor of Agricultural Economics at Oregon State University, has resigned to continue his present assignment as Agricultural Economist with the Food and Agriculture Organization at Mexico City. Dr. Plath will work on land use and adjustment problems in Central American countries.

CHARLES PUGH has returned to the staff of the Department of Agricultural Economics at North Carolina State College after two years of graduate study at Purdue University.

MARK REGAN, Farm Economics Division, ERS, recently spent 4 months in South America with the Economic Commission for Latin America, a UN agency. He was the resource economist member of a team that appraised water resource development possibilities in Bolivia.

V. JAMES RHODES has been promoted to the rank of Professor of Agricultural Economics at the University of Missouri.

ROLAND R. ROBINSON, Farm Economics Division, ERS, has transferred to the State Experiment Stations Division, ARS.

FLOYD ROLF, formerly of the State Statistician's office, South Dakota, is now Statistician-in-Charge in Arizona.

GORDON D. ROSE has been appointed USDA Collaborator with the Farm Economics Division, ERS, stationed in the Department of Economics and Sociology at Iowa State University, where he is also continuing graduate work.

CHARLES SARGENT, who recently completed the requirements for the Ph.D. at University of Wisconsin, joined the staff at Purdue University as Assistant Professor effective July 1.

ELMER L. SAUER, formerly with USDA, has joined the staff at the University of Illinois as Professor of Agricultural Economics. He will have leadership in agricultural economics for the Illinois program in rural and community development.

RICHARD F. SAUNDERS, Associate Professor in the Department of Agricultural Economics at the University of Maine, has resigned to accept a position as Agricultural Consultant with Arthur D. Little, Inc., Cambridge, Massachusetts.

THEODORE W. SCHULTZ, University of Chicago, has been awarded a Ford Foundation Faculty Research Fellowship for the academic year 1961-62. He is presently serving on two government panels: The State Department Panel on Educational, Cultural, and Scientific Activities with Latin America and the White House Panel on Science and Technology.

HERBERT K. SCOTT has transferred from the Edmonton, Alberta, office of the Economics Division, Canada Department of Agriculture to the Ottawa headquarters, where he will be in the Land Economics Unit.

JAMES SHAFFER was promoted to professor at Michigan State University on July 1.

JOHN W. SHARP, Ohio State University, was in Syria from May 15 until June 15 making a grain storage survey for the Syrian Government and the World Bank.

SOL. SINCLAIR, Head, Department of Agricultural Economics and Farm Management, University of Manitoba, was awarded a Canada Council Senior Fellowship. He will use this for a study of the European Common Market while on a year's sabbatical leave from his position commencing September 1st.

JOHN H. SITTERLEY, Ohio State University, will be on sabbatic leave in Europe doing Farm Management and Land Economics Research from July 1 through December 31.

HAROLD D. SMITH, of the Agricultural Economics Department, University of Maryland, was recently elected to the Maryland Chapter of Phi Kappa Phi.

RICHARD K. SMITH, Director, Agricultural Estimates Division, SRS, received a USDA Superior Service Award on May 23 "for demonstrating exceptional competence in the technical coordination and direction of the work of the Agricultural Estimates Division."

JOHN H. (DIXIE) SOUTHERN has been appointed Chief of the new Rural Development Branch, ERS.

JAMES R. STANDLEY has transferred from the State Statistician's Office at Topeka, Kan., to the State Office at Oklahoma City.

DONALD D. STEWARD, Ohio State University and Farm Economics Division, ERS, left for India in July for a two-year assignment with the ICA-sponsored Ohio State University team.

CLYDE STEWART, Farm Economics Division, ERS, took 6 weeks of leave in May and June to participate in an economic evaluation of an irrigation project in the Jordan Valley for the Harza Engineering Company, Chicago. The project is under Jordan's East Ghor Canal Authority, with headquarters in Amman.

GEORGE W. STOCKING, of Vanderbilt University, will resume the chairmanship of the Department of Economics and Business Administration in September.

EVERETT G. STONEBERG has been promoted to Associate Professor in the Department of Economics and Sociology at Iowa State University.

DONALD M. STREET, Auburn University, has resigned as Instructor in Economics and Business Administration to enter the Graduate School at Pennsylvania State University.

ANTHONY M. TANG, of Vanderbilt University, will serve as Acting Director of the Graduate Program in Economic Development during the academic year 1961-62.

RUSSELL G. THOMPSON, who has completed the requirements for the Ph.D. at the University of Minnesota, has accepted a position as Assistant Professor in Agricultural Economics at Texas A and M College.

ALEX H. TURNER, J. F. BOOTH and F. SHEFRIN represented the Canada Department of Agriculture at the Rome meeting of the FAO advisory committee dealing with the UN resolution on food for underdeveloped countries.

ROY N. VAN ARSDALL, agricultural economist with the Farm Economics Division, ERS, has been given a part-time teaching appointment at the University of Illinois with rank of professor to assist in the program in agricultural economics. He was a recent recipient of a USDA Certificate of Merit and cash award.

COSTAS VARKARIS, formerly with the Economics Division, Canada Department of Agriculture, has joined the Economic and Statistics Branch of the Department of Defence Production, Ottawa.

FREDERICK V. WAUGH, Director, Economic and Statistical Analysis Division, ERS, received one of the six Distinguished Service Awards presented by the Department of Agriculture in ceremonies on May 23. Dr. Waugh received his award "for pioneering contributions in agricultural economics, marketing, and statistics, inspiring leadership of professional workers, and notable contributions to the public understanding of farm problems and programs."

PETER WEBER, Agricultural Estimates Division, SRS, has transferred from the Dairy Statistics Branch to the Crop Reporting Board.

ORIS V. WELLS has been appointed Assistant Director-General in charge of the Economics Department of the Food and Agriculture Organization of the United Nations, in Rome. His acceptance of this post terminated 32 years service in USDA, which he entered as Junior Agricultural Economist in 1929, and where he was Chief of the Bureau of Agricultural Economics from 1946 to 1953, and had been Administrator of the Agricultural Marketing Service since its establishment in 1953. His previous FAO activities included serving as statistical adviser in 1945, as adviser to numerous U.S. delegations to FAO Conferences, and as a member of the FAO Program Committee from 1953 to 1959.

JERRY G. WEST has been promoted to Associate Professor of Agricultural Economics at the University of Missouri.

G. B. WHITMAN, Associate Professor of Farm Management in agricultural economics at the University of Illinois, will retire September 1.

JOHN L. WILLIAMS, Research Assistant, Department of Agricultural Economics, Clemson College, will join the research staff at Mississippi State University in September to work toward the Ph.D.

J. W. L. WINDER, of the Department of Agricultural Economics, Ontario Agricultural College, will spend twelve weeks at Queen's University, Kingston undertaking research with the Institute for Economic Research. Dr. Winder has received a Canada Council grant to assist him in this work.

LAWRENCE WITT was in Colombia during April and May as part of the Kellogg sponsored project of Michigan State University. While there he gave a series of 16 lectures in Spanish on agricultural development, economic development and methodology.

WILLARD WOOLF, who received his Ph.D. in Agricultural Economics at Louisiana State University in June, has joined the staff of the Department there, working in farm management.

MARTIN H. YEH has been appointed Assistant Professor in the Department of Agricultural Economics and Farm Management, University of Manitoba.

Economists who have visited Argentina in recent months as advisers on "Operation Beef" include: on agricultural census, WARDER B. JENKINS, Bureau of the Census; on livestock statistics, ROBERT S. OVERTON, Statistician in Charge of the SRS Western Livestock Statistics Office, Denver; on domestic demand for meat, HAROLD ABEL, Denver office of the Marketing Economics Division, ERS; on foreign demand for Argentine beef, HAROLD F. BREIMYER, Council of Economic Advisers, ROGER W. GRAY, Stanford University, V. JAMES RHODES, University of Missouri, and JERRY GOODALL, AMS; and on transportation, JAMES R. SNITZLER, Washington, D.C., and CHARLES WOOTAN, Texas A. and M. College.

The operation, designed to improve beef cattle production and marketing in Argentina and increase export earnings from livestock products, is carried on under an informal agreement by the International Cooperation Administration and the Government of Argentina with Texas A. and M. College. Economic aspects of the operation were planned by JOHN G. MCNEELY and are being coordinated by JARVIS E. MILLER, who is in Argentina on a two-year assignment with ICA.

## OBITUARY

THURSTON M. ADAMS, head of the Department of Agricultural Economics at the University of Vermont, was drowned while fishing alone on Lake Champlain on July 5, 1961. Born in Iowa in 1909, he received his B.S. from Iowa State College in 1932, his M.S. from University of Vermont in 1935, and his Ph.D. from Cornell University in 1943. He had been at Vermont since 1934, and had been head of the department there since 1945. Much of Dr. Adams' early work was in the field of food prices, especially the development of historical price series. In recent years he had devoted most of his time to teaching and extension, especially as related to marketing of milk. He was well known for his work with milk marketing orders in New England and New York.

JAMES B. ANDREWS, who retired in 1958 as Professor of Farm Management at the University of Illinois, died on May 15, 1961. Professor Andrews first joined the Illinois staff in 1913 as fieldman for the detailed cost work in Hancock County. He served Illinois agriculture in many capacities, having worked as fieldman in the Farm Bureau Farm Management Service, and with the Resettlement Administration, the Soil Conservation Service, and the Agricultural Extension Service. He was project leader of the land-use planning program and was active in the early work of the Agricultural Adjustment Administration. Professor Andrews devoted the latter part of his active career to the management of the University of Illinois endowment farms.

## WINTER PROGRAM OF THE AMERICAN FARM ECONOMIC ASSOCIATION, JOINT SOCIAL SCIENCE ASSOCIATION MEETINGS

New York, New York, December 26-29, 1961

*Tuesday, December 26*

8:00 P.M. Executive Committee Meeting

*Wednesday, December 27*

Morning Session

THE SCOPE OF FARMER COOPERATIVES

*Chairman:* GLEN W. HEDLUND, Cornell University

*Papers:* Present and Future
JOSEPH G. KNAPP, United States Department of Agriculture
Obstacles and Opportunities
D. B. DELOACH, University of California

*Discussants:* GLEN LAKE, Michigan Milk Producers Association
W. F. MUELLER, University of Wisconsin

Afternoon Session (Joint with American Economic Association)

RURAL POVERTY AND NATIONAL POLICY

*Chairman:* WILLIAM H. NICHOLLS, Vanderbilt University

*Papers:* Economic Security for Agricultural Labor
LOUIS LEVINE, United States Department of Labor
Relations of the Low Income Farm Problem to Major National Economic Problems
WILLIAM E. HENDRIX, United States Department of Agriculture

*Discussants:* LEONARD P. ADAMS, Cornell University
JOHN G. MCNEELY, Agricultural and Mechanical College of Texas

*Thursday, December 28*

Morning Session

THE FAMILY FARM IN DOMESTIC AND FOREIGN LAND TENURE POLICY

*Chairman:* JOHN BLACKMORE, University of Massachusetts

*Papers:* Problems in Domestic Policy
MARSHALL HARRIS, State University of Iowa
Problems in Foreign Policy
ERVEN LONG, U. S. International Cooperation Administration

*Discussants:* PETER DORNER, University of Wisconsin
HOWARD E. CONKLIN, Cornell University

Afternoon Session (Joint with Econometric Society)

MEASURING SOCIAL COSTS OF ALTERNATIVE AGRICULTURAL PROGRAMS

*Chairman:* GEORGE G. JUDGE, University of Illinois

*Papers:* Analytic Framework for Measuring Social Costs
MARTIN J. BAILEY, University of Chicago
Measures of Social Costs of Agricultural Programs
T. D. WALLACE, North Carolina State College

*Discussants:* JAMES P. CAVIN, United States Department of Agriculture
(Another discussant not yet determined)

6:30 P.M. Dinner Meeting of AFEA members

*Speaker:* HENRY A. WALLACE
A New Dealer Looks at the New Frontier

*Friday, December 29*

Morning Session (Joint with American Marketing Association)

THE FOOD STAMP PLAN

*Chairman:* FREDERICK V. WAUGH, United States Department of Agriculture

*Papers:* A Progress Report
HOWARD P. DAVIS, United States Department of Agriculture
Some Reactions of the Food Trade
S. KENT CHRISTENSEN, National Association of Food Chains

*Discussants:* ROBERT C. KRAMER, Michigan State University
(Another discussant not yet determined)

Afternoon Session (Joint with American Statistical Association)

(Program not yet developed)

## UNIVERSITY OF ALBERTA

### Professor or Associate Professor of Agricultural Economics and Farm Management

The University of Alberta invites applications for the position of Professor (or Associate Professor) and head of a department of Agricultural Economics and Farm Management which is being established. Salary and rank to be determined by experience and qualifications. (Minimum $9,000 for Associate Professor and $12,000 for Professor).

Applicants should hold the Ph.D. degree or equivalent with specialization in Agricultural Economics and/or Farm Management, and should have a strong background in Economics. An appointment at the Professor rank is preferred but able candidates with less extensive experience and fewer publications will be considered for appointment in the Associate Professor rank. Duties will include the initiation and development of a research program, undergraduate and graduate teaching and some extension work. Duties to commence as early as practicable but not later than September 1, 1962.

Enquiries about details and prospects are invited. Applications, giving age and other personal information, academic qualifications and transcripts, experience, and the names of four references, together with a recent photograph or snapshot, should be sent to

**The Dean, Faculty of Agriculture**
**University of Alberta**
**EDMONTON, Alberta**

Issued July 1961.

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*Volume LI* *June 1961* *Number 3*

ARTICLES

The Short Cycle in Residential Construction 1946-59 ..... *Jack M. Guttentag*
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Problems and Possibilities of Industrial Price Control: Postwar French Experience
..... *John Sheahan*

REVIEW ARTICLE

Equilibrium Growth Models ..... *Joan Robinson*

COMMUNICATIONS

Research, Invention, Development and Innovation ..... *Edward Ames*
Foreign Exchange Guarantees and the Dollar ..... *Sterie T. Beza and Gardner Patterson*
The Wellesley Undergraduate Tutorial ..... *Richard V. Clemence*
Windfall Income and Consumption—Additional Evidence ..... *Mordechai E. Kreinin*
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Reply ..... *Joseph V. Yance*
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# FOOD RESEARCH INSTITUTE STUDIES

**Volume II** **May 1961** **Number 2**

*Contents*

Agricultural Productivity, Economic Growth, and the Farm Policy Motivation of Urban Electorates ..... *Karl Brandt*

Change in the American National Diet .....
..... *Merrill K. Bennett and Rosamond H. Peirce*

The Food Economies of Urban Middle Africa: The Case of Ghana .....
..... *Thomas T. Poleman*

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The Measurement of Intra-City Locational and Residential Patterns ..... *Beverly Duncan and Otis Dudley Duncan*

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**Vol. XIV. No. 3.** **May, 1961**

CONTENTS

Towards a Theory of Feeding Dairy Cows ..... *M. B. Jawetz*
Economics and Animal Husbandry ..... *Dr. K. L. Blaxter*
The Farm Economist and Crop Experimentation ..... *Prof. M. McG. Cooper*
The Organisation of Agricultural Experimentation ..... *P. J. Macfarlan*
Economic and Technical Optima in Peasant Agriculture ..... *Eric S. Clayton*
The Timing of Farm Machinery Replacement ..... *W. J. Dunford and R. C. Rickard*
The Problem of Periodic Re-organization in American Agriculture ... *Quentin W. Lindsey*
The Eastern Regional Marketing Board, Nigeria ..... *J. H. Smith*
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***University of Saskatchewan***
***Saskatoon, Saskatchewan***

*Volume IX* *1961* *Number 1*

CONTENTS

Implications of European Integration for Canadian Agricultural Exports ..... L. A. Fischer
The Optimum Culling Policy—A Replacement Problem ..... W. Candler and A. B. Ward
Economics of Calf Production: Review of Present Concepts ..... V. J. Miles, E. W. Kehrberg, W. J. Pigden and V. S. Logan
An Analysis of Resource Productivity on Farms in the Newdale-Hamiota Area of Manitoba .... L. Auer

PROCEEDINGS PAPERS ON AGRICULTURAL EXTENSION:

Extension Opportunities in Marketing ..... R. B. How
Discussion ..... J. K. Mann
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